The Monthly Review

Published by the AMERICAN ELECTRO-PLATERS' SOCIETY

JULY 1938

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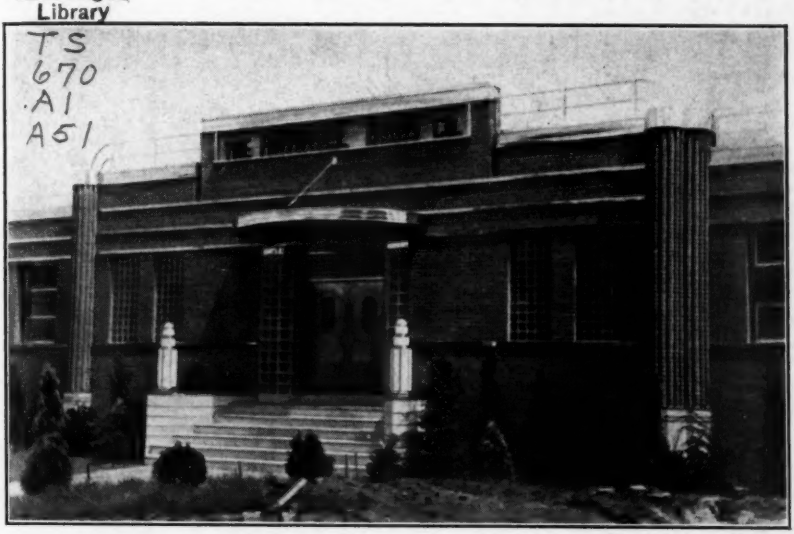

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The Monthly Review

Published by the AMERICAN ELECTRO-PLATERS' SOCIETY

A Society for the Advancement of the Science of Electro-Plating

JULY 1938

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SUBSCRIPTION $3.00 A YEAR

Entered as second class matter at the Post Office at Springfield, Mass., September 8, 1930, under Act of August 24, 1912.

Acceptance for mailing at special rate of postage, provided for in section 1103, Act of February 28, 1925, authorized September 3, 1926.

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The MONTHLY REVIEW

Published by the
AMERICAN ELECTRO-PLATERS' SOCIETY

Publication and Editorial Office
90 Maynard St.
Springfield, Massachusetts

VOL. XXV JULY 1938 NO. 7

Editorial

Chicago Branch of the A.E.S. hung out the welcome sign to all delegates attending the Milwaukee Convention on Saturday Eve, June 11, their regular meeting night. Nearly all the members of the Executive Board as well as many visitors from the East were present.

Past Supreme President Oscar Servis was Master of Ceremonies and introduced the Supreme Officers and others. After the meeting adjourned refreshments were served. The remainder of the evening was spent in renewing acquaintances and forming new friendships. All present appreciated the invitation extended by Chicago Branch officers to the delegates and others on their way to the Convention.

The 26th Annual Convention of the A.E.S. opened at 9 a. m. on Monday June 13th, at the Schroeder Hotel, Milwaukee.

General Chairman, R. M. Goodsell called the meeting to order, and introduced Mayor Daniel Hoan, who gave a fine talk as he welcomed the members of the A.E.S. to Milwaukee. His Honor was given a warm expression of thanks as he left the platform.

President Wilson was then introduced and took up the various items of business, customary at the first business Session.

The President in his report went into every fine detail regarding our advertising program urging every member to give careful consideration to this most important item of our Society' finances. The Educational Sessions were unusually well attended, it was remarked by many that there was more attention paid to these sessions this year than was noticed at any recent convention. The papers were of exceptional value and were well presented. Long discussions followed each paper which showed the keen interest manifested by those who attended the meetings.

The social events and plant visits were nicely arranged, the result of careful planning by the committee in charge. Everything in connection with this year's annual meeting seemed to harmonize, not a discordant note was struck throughout the entire proceedings.

The most important meeting from a business standpoint started on Thursday at 8.30 a. m. and continued until 4.30 p. m. with an occasional recess and a half hour for lunch. The proposed changes in the Constitution were the subject for discussion. It was decided at the beginning of the meeting that the items agreed upon by all the branches as noted in the questionnaires should be quickly disposed of, which was done, this left the remainder of the time for discussion of paragraphs that were not agreeable to all, and on which there were differences of opinion.

Since there was so much business transacted at this session and not having the reporters copy as yet, we must rely on memory as we try to give our readers some of the most important developments. We must mention also, that there were many minor changes acted upon which we have not the space to include here, these will appear in the copies of the proceedings and will also be written into the New Constitution and By-Laws.

Supreme Society:—The words "Supreme Society" will continue to be used instead of "National Society" as proposed.

Change in Fiscal Year:—The Fiscal year of the Supreme Society and Branch Societies shall commence the first day of May and end April 30. This was deemed advisable in order to give the Branch Secretaries and the Executive Secretary more time to get the records together previous to the Convention.

Associate Membership:— Article 2—32. These shall consist of any persons not qualified for active membership who are engaged in any phase of the electroplating industry, and in the aims and welfare of this Society. Associate members shall be elected by a majority vote and shall have all the privileges of an active member except being eligible to election to the Supreme Society. Before final action was taken on this item the words "engaged in" were substituted for "interested in". Since this above paragraph was approved, Associate members can now hold office in the local Branch, but cannot be elected as delegates to the Supreme Society.

Copies of the Proceedings:—

The delegates voted to give each member in good standing a copy of the Convention proceedings free, starting this year, which means that an increase of ten per cent in per capita tax will be required of each Branch commencing June 1, 1938. The increased per capita tax will be used to help pay for the Copies of the Proceedings. Everything possible is being done to get these copies to our members by August 1. There is a lot to be done however, such as editing, condensing, copyrighting and other details, so we ask our readers to be patient inasmuch as we are working under rather unusual conditions this year. The Proceedings will be sent to the Branch Secretaries for distribution as soon as they are ready. In addition to the action taken regarding the constitution, the following items will also interest our readers.

Officers elected for 1938-39 are:—

President	W. M. Phillips, Detroit
1st. V. Pres.	R. M. Goodsell, Milwaukee
2nd. V. Pres.	F. Fulforth, Philadelphia
3rd. V. Pres.	J. L. Downes, Middletown, Conn.

Mr. George B. Hogaboom, First President of the A.E.S. installed the officers at the banquet. The Gold Medals and diplomas were presented after the installation by Mr. Phillips, the newly elected President.

At the first Executive Board meeting, with all members present, Mr. Phillips appointed as follows:— Chairman of Membership Committee, R. M. Goodsell, 1st. V. Pres.; Chairman of Educational Committee, Fred Fulforth, 2nd V. Pres.; Chairman of Exhibits Committee, Joseph L. Downes, 3rd V. Pres.; Executive Secretary, W. J. R. Kennedy.

IN APPRECIATION

We take this opportunity of thanking Austin Fletcher of Binghamton Branch for his work in making the exhibits at the convention such an outstanding success. We know something of the task involved in getting the branches to contribute and the labor involved in transportation to and from Milwaukee. Both Mr. Fletcher, and Mr. Henry Bornitzke of Milwaukee Branch are to be congratulated for the energy and enthusiasm displayed in making the exhibit feature of the convention program something which we as well as they can well be proud of. Thank you boys; you did a fine job.

EXHIBITS

The following awards for exhibits at the Milwaukee Convention were made:

1st Prize	LEON HAAS	Dayton Branch
2nd Prize	FRANK SAVAGE	Chicago Branch
3rd Prize	J. DRYDEN	Chicago Branch

BRANCH EXHIBIT Dayton Branch

PAPER AWARDS

The A.E.S. Gold Medal was awarded to W. L. Pinner, Detroit Branch and L. B. Sperry, Grand Rapids Branch on their paper "Experiences in Evaluating Plated Coatings." Read at New York 1937 Convention.

The Founder's Gold Medal was awarded to Frank Mesle of the Rochester Branch, his paper being "A Resumé of Silver Plating" read at New York 1937 Convention.

The Herminie Dorothea Proctor award was given to Robert M. Wagner of Anderson Branch for his paper on Rochelle Salts Cyanide Copper Baths. This is a joint paper presented by Mr. Wagner and Dr. M. M. Beckwith.

W. M. PHILLIPS, *President*

Message from Our President

Another convention has made history. Our Society has taken important action in clarifying and making some important changes in its Constitution.

There were some differences of opinion; but I feel particularly proud of the members of this Society in that all differences were differences of honest opinion. Discussions were courteous and sportsman-like, and, now that we have made up our minds, all differences can be forgotten. It is time for action, and the changes in our policy put it clearly up to us to do a number of things.

1. The REVIEW will be needing new and up-to-date material to take the place of convention papers, which will be

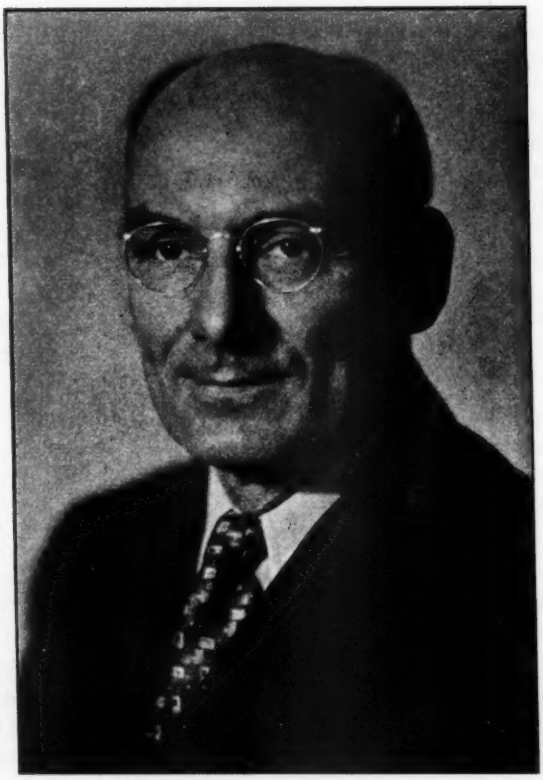
published and distributed in accordance with the vote of our members. There is no doubt that we can help Mr. Kennedy in making the REVIEW one of the best technical papers in the country. There are many interesting branch meetings throughout the entire year, at which are delivered some very interesting talks and some very valuable discussions. If the secretaries of the branches will send these in to Mr. Kennedy, he will arrange them and publish them in such a way that the periodicals will be valuable to everyone. For one thing it will make the advertising space more valuable; but, more important, it will make us all better men for the jobs we are filling, or intend to fill.

2. With the broadened membership, particularly the associate membership, we can get more good members. Let's get them to go with us, paying particular attention to the younger men in our profession. There are a great many of these young men who will be valuable now and later to the Society. Please remember that plating is a comparatively new art, and we are all young men in it, so that the more we can help each other, the more we will help ourselves and the industry as well.

3. There is one matter which did not come up for official discussion at the convention, but which is important: it has to do with the annual educational sessions and banquets of our branches. These are very valuable, and I hope that they continue to improve as they have in the past, for I do not believe there is any more important activity in the whole Society than are these educational sessions and banquets. There is just one thing about which there have been some complaints, and that is the fact that many of our branches have solicited the suppliers of plating equipment and supplies for financial contributions. Let's give these people a break, and make these parties our own parties by charging enough for the tickets to defray any expense of entertainment which may be involved. There are a great many other ways in which our friends, the suppliers, will be glad to help and for which the whole Society needs their support.

Thank you a lot; and pardon the new President for writing at such length.

W. M. PHILLIPS, *President*,
American Electro-Platers' Society



R. M. GOODSELL, *1st Vice-President*

Message from R. M. Goodsell

Having been appointed Chairman of the Membership Committee by President W. M. Phillips, we have written a letter to all of the Branches requesting them to send in the name of one member who would be willing to serve as chairman of the membership committee of their branch and have already received replies from several of the branches complying with our request. Just as soon as this list is completed the real work of the membership drive will begin.

As you know Article 2, Section 3 relative to associate membership was revised to read as follows: "These shall consist of any persons not qualified for active membership, who are actively engaged in any phase of the electroplating industry and in the aims and welfare of this Society. Associate members shall be elected by a majority vote, and shall have all the privileges of an active member except being eligible to election to the National

Society." This means that the way is open for a real drive for new members, but have this one thought in mind — not to be over zealous in increasing your membership with men who may be a hindrance to your branch rather than a help.

However, we feel with the full cooperation of all the Branches that our membership can be substantially increased with men who would be of valuable assistance to the future welfare of the A.E.S. R. M. GOODSELL, *Chairman of Membership Committee.*

To Our Members

F. FULFORTH, *2nd Vice-President*

The educational activities have been very ably handled in the past as proven by our fine speaker personnel and the intelligently condensed abstracts, particularly those of Mr. Phil Ritzenthaler for the clarity and wide range of his selectivity, those of Mr. Paul Oldham, the foreign language extracts of the Messrs. Walter Meyer, C. T. Thomas, and Dr. Wm. Blum as well as many others too numerous to mention individually, but

all appreciated equally for their interest and devotion to this painstaking but essential labor.

The following members are known to have accepted for continuance of the abstract work and the list of publications from which excerpts in the past years have been made is also printed, so that the membership may judge whether additions are necessary to either list and if so a suggestion to this office will receive thankful acknowledgement and consideration, while if any omissions or errors are present, the purpose of this letter will be served by communicating them.

Should anyone desire to have either an individual speaker added to our list or some particular subject placed on the programs, again a line to this office will be sufficient to secure action, while it is hoped the branches will supply a list of their individual speakers, particularly fellow active members giving practical papers other branches should have an opportunity to discuss. More detail of this work will be presented directly to each local secretary for collaboration with his membership.

The honor tendered me by the last convention is deeply appreciated, while the privilege of working with the type of men constituting our executive board is one that comes but rarely in a lifetime and it is my earnest wish to fulfill both their and your wishes to the best of my ability for which opportunity I thank you.

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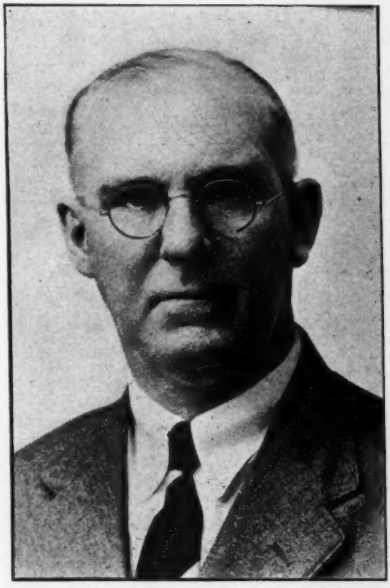

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Ceramic Industry
Chem. and Met. Engineering
Comptes Rend (France)
Chemistry and Industry
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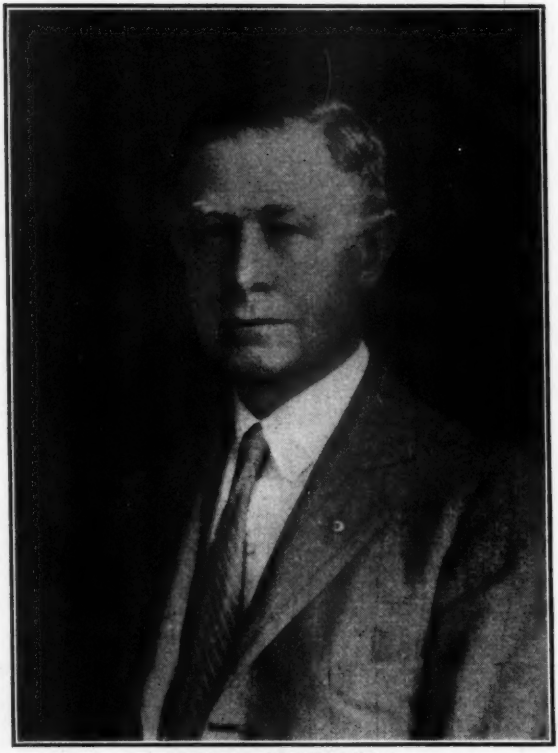
FREDERICK FULFORTH.



PHILIP SIEVERING

Entered the electroplating vocation in the year of 1877, worked in Newark, New Jersey for several firms and then made connection with the Singer Sewing Machine Co., about 1881. In 1886 he was advanced to foremanship and continued as such until March 12, 1888 when he was placed in full charge of the plating department until he resigned June 9, 1890 to venture in the jobbing business in which he has continued to date. He now runs one of the largest jobbing shops in the country, employing about 200 men and occupying about 40,000 square feet of floor space.

He joined the New York Branch of the A.E.S., and became a charter member of the Newark Branch. He has held practically all the offices of the Branch, has been elected delegate to a number of the A.E.S. conventions. He was appointed Treasurer of the Research Committee which office he held for five years. At the annual convention held at Rochester in 1931 he was elected Supreme President and at the Milwaukee Convention in 1938 he was elected an Honorary Member. He has been active in the plating business for 61 years and in the jobbing business for 48 years.

The Specialization *of* Finishes *and Its* Effect *on the* Work *of the* Electro-Plater

By GUSTAVE KLINKENSTEIN
Vice-President and Technical Director
Maas & Waldstein Co., Newark, N. J.

Delivered Before the Springfield Branch
November 20, 1937

Not so many years ago, the electro-plater had at his command only a limited number of finishes for his products. These finishes consisted of paints, varnishes, varnish-enamels, japans, and a few clear lacquers, and most of them had been manufactured for years according to standardized formulae. Every experienced finisher knew all he needed to know about each of these finishes, and, within their limitations, which he clearly recognized, he was able to use each to the best advantage.

But since that time, the finishing business has been revolutionized. Chemical science has made available thousands of new raw materials for finish manufacture — lacquer bases, solid and liquid plasticizers, natural and synthetic resins, pigments, solvents, and thinners — and new ones are being added every day.

As each of these materials, either alone or in combination with other materials, imparts certain properties to the finish, an unlimited number of new finishes can be produced, and tens of thousands actually have been developed within the past few years.

This development would not have taken place if there had been no need for it. If only a few different kinds of finishes would suffice for all purposes, it would be fine for all of us. But, unfortunately, this is not the case. Finishers of metal products have a multitude of requirements and a multitude of different finishes is needed to meet them.

On the other hand, so great are the present resources of the finish manufacturer, that he can, broadly speaking, supply any kind of a finish that the electro-plater may want.

He does not always do so, of course. We all know that finishes do not always do everything expected of them. But, granting the manufacturer is a reliable one and knows his business, most

finishing failures occur for either (or both) of two reasons:

1. The finish manufacturer did not know all the facts in the case, and, hence, submitted a finish that was unsuitable in one or more particulars.
2. The user of the finish, through ignorance or carelessness, applied the finish on products or in ways for which it was not intended, and hence subjected it to conditions for which it was not designed.

You cannot purchase finishes, like pencils or lubricating oil, in the open market from an unknown maker. You must come into personal contact with the representative of the supplier of your finishes and work out with him the best solution for each finishing problem as it arises. Otherwise, because modern finishes are developed to meet specific conditions and none other, you are, sooner or later, bound to have trouble.

In other words, the experienced finisher of today cannot know all he ought to know about the finishes he is using. Their composition has become too complex and varies too widely for that. The user of finishes should look to his supplier for expert, conscientious, painstaking service, and if he does not get it, he ought to look somewhere else.

Because of the very nature of its products and processes, the electro-plating industry has to contend with more finishing problems than any other industry. These problems have been studied intensively for many years by the finish manufacturing industry and a wide variety of finishes have been developed to meet the electro-plater's needs.

In preparing each of these finishes, consideration has to be given to the following factors:

1. The material of which the product is made.
2. The service to which it is to be subjected.
3. The plating and finishing processes through which it passes.

As these factors vary widely with almost every job the electro-plater turns out, the finishes he uses must, in most cases, be highly specialized. There are, it is true, certain clear lacquers that can be used indiscriminately, with apparently good results, on products made of copper, brass, bronze, nickel, and silver, but, except on jobs of minor importance, it is rarely advisable to use such "general purpose" lacquers. In doing so, the electro-

plater runs the risk of using a finish that is either unnecessarily expensive for the work in hand, or incapable of giving the proper protection to the metal on which it may be applied.

Thus, lacquers for silver and nickel must be crystal clear and entirely colorless, and it is a waste of money to use them on brass and other colored metals. Moreover, neither the lacquer film nor the metal on which it is applied is chemically inert. They tend to react on each other, and unless the lacquer is specifically designed to withstand the action of the corrosion products of the metal, it is liable to be attacked and its film destroyed. We have yet to see a lacquer that is suitable for brass and, at the same time, will give equal service on copper. Yet it is common practice to use the same lacquer for both metals.

When the product is to be used out of doors, care in selecting the right lacquer for the given metal is especially necessary. To be careless in this matter may result in a high percentage of damaged goods.

Again, a lacquer that gives good results on solid brass may be utterly unsuited for finishing products plated with this same metal. The reason for this lies in the fact that the plated coating invariably carries in its pores traces of the salts used in the plating bath. These residual salts cannot be completely removed by rinsing, no matter how carefully done or how often repeated, and, unless something is done to prevent their action, they will sooner or later absorb moisture and form a solution which spreads over the surface of the product, causing what is known as "stain spotting". The cyanides are particularly troublesome in this respect.

Special lacquers must also be used for products, whether plated or solid, that have "oxidized" finishes; that is to say, dark finishes produced by treatment with sulphide solutions. Such finishes are subject to what is known as "crystal spotting", which is caused by the action of sulphur in either the air or the packing materials. Care in handling and packing oxidized products will minimize crystal spotting while they are in the maker's hands, but after they are shipped they can be protected from this defect only by finishing them with lacquers especially designed to inhibit the formation of these spots.

For each of the following metals — aluminum, zinc, magnesium, cadmium, chromium, and their alloys — a specially developed finish must be used. Each of the metals has chemical and physical peculiarities which have proved very troublesome to the finish manufacturer, and only recently have some of the problems thus presented been solved. However, satisfactory finishes, both clear and pigmented, can now be obtained for all of these metals.

But the chemical characteristics of the material to be finished provide only a few of the factors entering into the problem of finish formulation.

The physical character of the material must be considered. Is the surface smooth or rough? Compact or porous? Flat, rounded, or irregular?

Service requirements vary widely. Some products, like clocks and picture frames, are by their nature carefully protected, but others are subjected to the roughest of treatment and their protective finish may be required to be resistant to such destructive agencies as marring, dampness, extremes of heat or cold, acids and alkalies, fruit juices and alcoholic beverages, household cleansers and chemicals, grease and oil, lighted cigarettes and matches, etc., etc.

Again, some finishes must be tough and flexible; others hard and durable; others soft and easily sanded. Some must dry naturally with a high, medium, or low gloss, or with no gloss at all; some must be capable of developing a brilliant polish under rubbing and buffing. Some must dry rapidly, others must remain sticky for a definite length of time, others must be suitable for baking.

Color introduces additional complications. Not only have the various pigments chemical and physical properties that have to be taken into consideration, but it must be possible to supply almost every pigmented finish in any desired shade. Finish manufacturers have standard color cards, but they are of little use except as standards of reference; most manufacturers want "something different" for their products.

These considerations by no means exhaust the factors that have to be considered in selecting a finish for a given product. Others include —

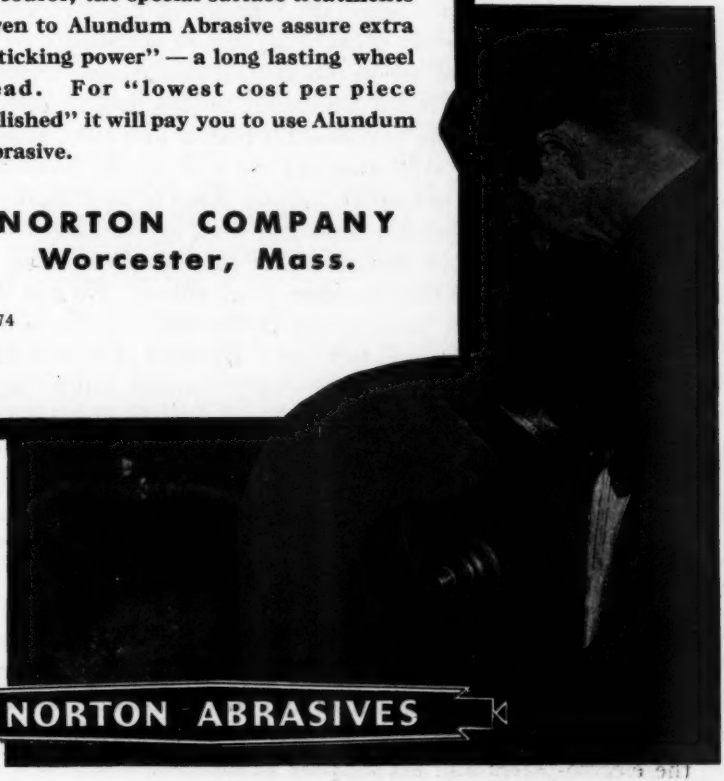
For Polishing Die Cast Metals...

ALUNDUM ABRASIVE

FINISH is usually important where die cast parts are being polished, for in many cases they are subsequently plated. The special sizing methods used in preparing Alundum Abrasive give the uniformity that assures good finish — no oversize grains to scratch and mar. And of course, the special surface treatments given to Alundum Abrasive assure extra "sticking power" — a long lasting wheel head. For "lowest cost per piece polished" it will pay you to use Alundum Abrasive.

NORTON COMPANY
Worcester, Mass.

G-74



NORTON ABRASIVES

The character of the plating, cleaning, and finishing facilities available.

The plating process employed.

The condition of the surface of the product when it is to be finished — whether clean, dirty, greasy, or scaly.

The processes to which the product is subjected after finishing — whether stamped, formed, machined, engraved, or otherwise.

The marketing details, such as quality, price, method of distribution, sales appeal of color, etc.

To the electro-plater, producing goods with attractive, durable finishes, at a reasonable finishing cost per unit, is all important. His business depends entirely on his ability to do this. To produce the best work at the lowest cost, he must make effective use of the wide variety of modern lacquers and enamels that are available to him. Since the number of highly specialized finishes has become so great and the requirements of each product to be finished are so exacting, it has become almost impossible for one who is not an expert in this field to select the finish that will give the best possible results in a given case.

The electro-plater will, therefore, do well to ally himself with a manufacturer of industrial finishes who is in a position to study his problems as they arise and who, by working with him continuously, can give him assurance that his finishing is being done in the most efficient manner at all times. No one should hesitate in asking for such service in the belief that it is an imposition on the finish manufacturer. By force of circumstances, we of the industrial finishing industry cannot simply sell our goods across a desk, ship certain cans, and then forget the matter. To render good service, we must be on the scene of action from the start to the end of every finishing job. Not only must we make up special formulae whenever they are required, but we must be prepared to change a formula instantly whenever some change in the product or the conditions of production demand it.

The chief effects of the continuing specialization of modern finishes on the work of the electro-plater are, therefore, first, to give the means for doing better and more profitable work, and, secondly, to make necessary close personal relations between the electro-plater and his supplier of finishes.

Purification *of* Solutions *by* Electrolysis

By V. MATTACOTTI
Hanson-Van Winkle-Munning Co.
Read at Chicago Banquet Jan. 15

IN surveying the development of the electroplating industry, of noteworthy interest is the increasing recognition of the part played by impurities in the various plating baths. From the obscure reasons assigned to difficulties decades ago, to the more definite reasons advanced today, one may observe a constant trend of thought designed to find the answer to such problems rather than to overlook them as being beyond understanding. The situation regarding impurities today is a more vital one than in years ago. Formerly solutions were made from chemicals whose impurity content was an unknown factor. However, because of methods of operation and the types of baths, these impurities tended to cause comparatively less difficulty than they occasion today. All are familiar with the manner in which platers adhered to the principle of working new baths. All baths were dummied for periods of time to break them in and we still recognize the importance of such a procedure. In effect such an operation conditions the bath by removal of impurities and the principle involved in this treatment plus a few refinements has become a leading method for removal of impurities from plating baths.

The increasing complexity in the makeup and operation of plating baths introduces the need for a more rigorous control of impurities than was needed in the simpler types of baths formerly operated. An observation of various processes in operation will show readily that there is contained in many formulas materials whose concentration is small. The effects of such additions are not, however, in proportion to the smallness of concentration. Brightness for example is produced in many deposits by small amounts of specific reagents. Such baths can be equally susceptible to the presence of minute quantities of other substances. Usually the effect is injurious and at any

rate undesirable. Such desirable qualities as adhesion of deposit, ductility, freedom from porosity, freedom from inclusions, maximum corrosion resistance, color and general visual appearance, etc., depend greatly on the degree of cleanliness of the bath.

Among the most common sources of impurities we can list plating salts, anode, anode bags, filters, rubber linings, improper rinsing prior to plating, certain types of water such as a high iron containing water, and in many instances the work itself. The latter is most common where brass tubing and other articles are being plated, giving rise to copper and zinc contamination from points that do not receive plating or from parts dropped in the tank.

The most common impurities usually encountered vary with the plating bath. Generally speaking in a nickel solution lead, zinc, copper, iron, and organic matter are most common. In a zinc solution a good deal of trouble is occasioned by copper, iron or nickel. Other solutions in process of observation are also troubled by the presence of small amounts of impurities as for example the presence of small amounts of certain inorganic materials in a cadmium bath. Most of the difficulties brought about by impurities can be traced specifically and usually either visual or chemical tests will indicate what is present. However it is often difficult to determine if organic matter is the cause and generally it is necessary to go through a process of elimination to recognize the presence of organic matter.

In solutions, impurities make their presence known by the effect they produce. In nickel for instance, the effect may be loss of throwing power (chrome for example), discoloration of the deposit (lead, copper, zinc), or embrittlement (organic matter such as glue, gums, dextrin, etc.). In bright zinc for instance irridescent discoloration on bright dipping might indicate the presence of a trace of cadmium, or darkness of the plate from the bath the presence of copper. In cadmium an extremely bright and brittle deposit might indicate the presence of such a substance as glue.

Advances in the method of recognizing impurities and their effects have been rapid this year. For example the adaptation of the bent cathode test has been of immense help. Very pure

solutions have been made and bent cathodes plated in them. Various impurities were added at different concentrations. When these additions were made the results became apparent on the bent cathode in the form of a dark colored ellipse on the inside of the bend. As the amount of the impurity increases the size of the discolored band increases and conversely as it decreases the indication is that the impurities are being removed from solution.

Before proceeding to a discussion of the bent cathode test and its application on a commercial scale let us review briefly other methods of removing impurities.

The first of these was presented to the industry by a man well known to most of you. I refer to the Liscomb Purification of nickel solutions evolved by "Dad" Liscomb years ago. In effect this involves a combination of methods. Briefly the pH of a nickel bath is raised to between 6.3—6.5 colorimetric, the temperature to 150°F., and ferrous sulphate and peroxide added. Raising the pH would permit such inpurities as zinc to precipitate out; addition of peroxide acts to oxidize organic material and the ferrous ion to the ferric form precipitating it as ferric hydroxide. The latter has a gel-like structure and tends to absorb impurities and floating material, and in settling, clarifies the bath. This treatment has been used successfully in the past two years for preparing baths for bright nickel work.

Another method involves the use of high current density plating and is generally referred to as breaking in a bath. We will illustrate later how this method, while serving the purpose, is actually a very expensive and unnecessary procedure.

A third method applicable where one is certain that the difficulty lies in the presence of organic material is in the use of peroxide alone. This treatment has been used successfully in dealing with organic contamination. The amount of peroxide involved is higher than that used in the Liscomb method ranging from 1/2 gal to 2 gallon of 100 volume peroxide per 100 gallon of plating solution. It is evident that this quantity of material would have a marked effect on the presence of oxidizible substances in a bath.

A fourth method in process of investigation is that involving

the use of Activated Carbon. This method is useful in dealing with certain types of organic matter and in particular very effective where contamination is traced to material from rubber linings. About 1 oz/gallon of activated carbon is used. The carbon may be stirred into the solution whose temperature is 140°F., or higher and kept agitated for several hours and then filtered. As an alternate method the carbon can be made into a slurry with water and this then run through a filter thereby caking the filter. The solution is then circulated through the filter until plating indicates purification to be complete. No harm is done by having the carbon cake in the filter.

Summarizing we have four methods which have been used or are in process of investigation.

1. Absorption on ferric hydroxide or the Liscomb purification. Effective for removing organic matter as well as metallic impurities.
2. High current density electrolysis used only to work in a bath. Very expensive because of the loss in metal plated out.
3. Hydrogen Peroxide treatment effective for removing certain types of organic matter. Also to remove iron, when smaller quantities of peroxide can be used.
4. Activated carbon useful for removing organic matter.

Previously we discussed briefly the use of a bent cathode to indicate the presence of impurities in a bath. The deduction that follows from an observation of the bent cathode shows a relationship between the current density and the plating out of impurities. The impurity shows first in the low current density zone, the less the amount of impurity the lower the range of current density in which its effect can be seen. This indicates that a reversal of the usual high current density procedure would be most effective. Such being the case the cost of purification in terms of current consumption and plated metal lost, is immensely reduced. (About 1/2 to one pound of nickel per 100 gallon of solution purified.) This method of purification is quite simple involving no filtration or the use of any equipment which is not found in any plating plant. Agitation of the solution is preferred where possible and beneficial also is the use

of a temperature of 125°F., to 150°F. The addition of sulphuric acid to the solution thereby dropping the pH permits less nickel to plate out since more of the current goes through toward the evolution of hydrogen. As high a cathode surface should be used as is possible. The time required for a purification depends on the cathode surface and on agitation. The time may vary from a few hours to a day, but in general is often a good deal less than would be required for chemical purification.

This method has been tried out in the Laboratory by making up solutions to which definite amounts of impurities were added and also on samples of commercial baths already contaminated. By electrolyzing these solutions with a suitable current density the impurity can be taken out so that its effect can no longer be noticed on plating a bent cathode. Laboratory experiments have shown that copper and lead are the easiest to remove. A solution badly contaminated with either of these can be purified by electrolyzing with a current density of 2 amperes per sq.ft. until the total current passed through the bath amounts to 2 ampere hours per gallon. Assuming a 1000 gallon bath with a cathode "dummy" surface of 50 sq.ft. at 2 amperes per sq.ft., the bath would require 2000 ampere hours of electrolysis or in this case 20 hours to purify. However, we have noticed that frequently only a part of this time is required because the concentration of impurities becomes lowered to the point where the effects are no longer apparent. Hence complete removal may not be necessary.

In removing zinc or iron somewhat higher current densities are required. At 5 amperes per sq.ft. these impurities are generally removed when a total of 5 ampere hours per gallon has been passed through the bath. Again this is for complete removal and we have noticed that after partial removal the effects tend to become very small. Continued production is permitted long before the 5 ampere hours per gallon has passed through and while work is plating the remainder of the impurities will pass out. These figures apply only when the solution is warm and agitated. If the solution is electrolyzed cold or without agitation lower current densities should be used. The latter method involves considerably more time.

The deposits obtained in electrolyzing the solution at low

current densities are generally dark in color at the beginning of the electrolysis. In the case of a nickel solution containing zinc the deposits are also very brittle. Toward the end of the electrolysis the normal color of the deposit is increasingly apparent and the dark zone tends to decrease in size.

This method has been used with marked success in purifying zinc baths contaminated by copper, etc., and has made possible the production of bright plate from zinc baths that were about to be discarded because of contaminating. The application of the method to certain bright nickel baths is now universal—further studies will indicate its application to other types of solution.

Tests have shown that some types of organic materials can be removed from nickel baths by electrolysis while others cannot. The best current density to use seems to depend on the particular impurity present. More study is needed to classify organic materials so as to note which may or may not be removed by this method. Commercially we have used this method with success in removing organic material which was causing brittleness in an alloy bright nickel bath. A combination of peroxide and low current density plating has effected the simultaneous removal of metallic and non-metallic impurities in another use. Where it is possible to remove organic material by this method in some cases very high current densities are needed ranging up to 150 amps. sq.ft. and in other cases down to 2 amps. sq.ft. In general lowering the pH with sulphuric acid will cut down the loss of metal due to the use of high current densities. However, where organic material is suspected and no means are available for determining whether or not it will plate out we advise the use of the peroxide oxidation method as being the most feasible.

Owing to the presence of many proprietory plating baths in plating plants today it is advisable to check with the supplier before applying any of the above methods. These procedures may tend to destroy or plate out certain substances whose presence is necessary to the operation of the particular bath.

To illustrate the application of the low current density method of purification we cite three instances of note.

In one case the deposit, nickel, was quite brittle and tests

showed the impurity to be organic. This impurity did not clean up readily by any of the other methods but did so on electrolyzing with a current density of 2 amps/sq.ft. for a total of 2 amperes hours per gallon. After this treatment the deposit was very ductile.

The second case concerned a solution with poor throwing power. On plating a bent cathode the contact mark was dark, the area in the bend was dark and so was most of the back. This solution was electrolyzed at a current density of 5 amps. sq.ft. for 5 ampere hours. At the end of this time another bent cathode was plated and the deposit was perfectly bright over the entire surface. In all probability more current was used to clean this solution than was actually necessary to remove the impurity and restore the throwing power.

In the third case the solution was fouled with dextrin. In this case electrolysis was not successful in removing the impurity in a reasonable length of time.

In conclusion the addition of this new method of eliminating impurities from a plating bath has brought a very useful weapon to the list of those employed by the plater in maintaining optimum, conditions in his plant. We recognize the limitations of application of this method; however, it will be found quite satisfactory in a majority of cases and already has become fixed as a standard procedure.

The writer is indebted to Dr. Louis Weisberg and his assistants for the material embodied in the above and for permission to use this material. Additional information* has been published by Dr. Weisberg in which greater detail and figures can be found.

LISCOMB METHOD—
ABSORPTION ON FERRIC HYDROXIDE

1. (1) Ferrous Sulphate .08 gr/gal. 0.12 oz./gal.
   (2) Hydrogen Peroxide 3-4 c.c./liter 0.33 fl.oz/gal.
   for 100 gallons use
   (1) 12 oz. Ferrous Sulphate
   (2) 33 fluid oz. 5% Hydrogen Peroxide
   or 6 fluid oz. 100 vol. Hydrogen Peroxide

* METAL INDUSTRY Sept. 1937

Warm the nickel solution to 125-150°F. Raise pH to 6.3-6.5 (Bromcresol Purple). For Watts solution use nickel carbonate. Sodium Bicarbonate can be used generally. Add dissolved ferrous sulphate to bath. Stir the mixture thoroughly. Add the peroxide with stirring. Let solution stand hot over night and then decant or filter off clear solution. Adjust pH of plating point and resume plating. Peroxide generally works out over night.

2. Hydrogen Peroxide Treatment for Removal of Organic Matter.
   (1) Raise temperature of bath to 140°F.
   (2) Add with stirring 1/2 gal. to 2 gal. 100 volume Peroxide depending on extent of contamination.
   (3) Let solution stand hot with stirring overnight. Organic material will be destroyed. If throwing power poor increase temperature of bath to expel all of peroxide.

3. Absorption on Activated Carbon. Organic Material.
   (1) Heat bath to 140°F.
   (2) Add 1 oz. per gallon activated carbon with bath with stirring.
   (3) Keep agitated for two hours.
   (4) Filter

or

   (1) Make slurry of required amount of carbon and water.
   (2) Pump through filter until filter cloths thoroughly caked.
   (3) Circulate warm solution (140°F.) through filter until plating indicates impurity gone.

4. Low Current Density Method.
   (1) Heat bath to 125°F.-140°F.
   (2) Agitate continuously.
   (3) Fill tank with as large a cathode surface as possible.
   (4) Operate at current density of 2 amperes sq.ft. for copper and lead.
   (5) Other impurities operate at 5 amperes sq.ft.
   (6) Pass 2 ampere hours/gallon in case of copper and lead.
   (7) Pass 5 ampere hours per gallon in case of zinc, etc.

the JETAL process

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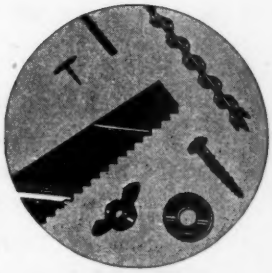

JETAL . . . simple . . . economical . . . enhances the appearance of products of iron or steel. Its lustrous, rich black finish does not alter dimensions or surface textures. JETAL is an oxide of iron and a part of the metal itself.

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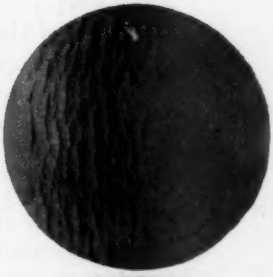

JETAL is an excellent base for modern paints, lacquers and enamels. It retards rust formation . . also allows subsequent coatings to develop their true adherence to the metal. Cut shows impact test made on enamel over JETAL. Note that the enamel film is still firmly adherent to the steel . . is finally fractured only when the steel itself parts. In such impact tests JETAL and enamel showed 300% more adherence than enamel and steel and no breakdown after 2,000 hours in a humidity cabinet.

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JETALized iron or steel, dipped in our Jet-oil, stops corrosion attack for long periods of time — in laboratory tests showed no appreciable attack after 450 hours in salt spray.

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Summary *of* Talk *on* Bright Nickel Plating

Given Before
The Philadelphia Branch of
The American Electro-Platers' Society
By
DWIGHT OVERCASH
Of The Brown-Lipe-Chapin Company
A Division of General Motors
At Syracuse, New York

I shall briefly describe our processes of bright nickel plating at the Brown-Lipe-Chapin Company. We have three kinds of bright nickel baths:

The Harshaw Nibrite.
McGean.
Harshaw Triple X.

All nickel plated parts are subsequently chromium plated irrespective of the bath used.

In the Harshaw Nibrite bath, brass only is plated, since this bath is best used on polished brass with nickel thicknesses of 0.0002″ to 0.0003″, for which our hub caps present a good example.

The procedure is to follow the polishing by an inspection, including racking and hanging on a snake conveyor, which delivers parts to the plating room, where the racks are lifted to the plating conveyor the first operation of which is cleaning, using the following methods:

SOLUTION:

1 gallon water.
2 ounces DRI-SIL by Quaker Chemical Co.
(supposed to be an ortho-silicate).
2% sodium resinate by weight of cleaner.
Time: 40 seconds.
Temperature: 190° F.
No Current.

This operation is followed by a cold spray rinse, then electro cleaning:

SOLUTION:

1 gallon water.
2 ounces DRI-SIL.
3/4% sodium resinate by weight of cleaner.
Time: 35 seconds.
Temperature: 190° F.
Current Density Minimum: 35 Amps. per square foot—cathodic.

Then comes an air agitated cold rinse succeeded by a reverse cleaner:

SOLUTION:

1 gallon water.
12 ounces soda ash.
Time: 10 seconds.
Temperature: 200° F.
Current Density Minimum: 35 amps. per square foot—anodic.

Another cold spray rinse and then a—

2% sulphuric acid dip for 30 seconds, concluded by a final cold spray rinse before plating.

NIBRITE NICKEL SOLUTION:

1 gallon water.
20 ounces single nickel salts.
3 ounces nickel chloride.
5.5 ounces boric acid.
1.5 to 2.0% NIBRITE brightener.
Time: 10 minutes.
Temperature: 135° F.
Current Density: 25 to 35 amps. per square foot.
pH: 3.7-4.0.
Filtration: Continuous.

The caps are now twice rinsed and chrome plated, without reracking then go through two hot spray rinses, a boiling hot rinse, unracked, placed on a belt conveyor leading to the chrome coloring and inspection department.

The empty racks are hung on the run around snake where they go into a caustic electric strip to remove any chromium plated on the contacts.

They are then spray rinsed and return to polishing inspection for further use.

The present schedule is 1200 to 1400 hub caps per hour with which we conclude consideration of Nibrite except I might add that temperature and pH have to be watched very closely as rapid changes in either will cause a cloudy deposit. All other bath constituents are controlled daily by chemical analysis.

McGEAN BRIGHT NICKEL

We have a 20,000 gallon tank in which we plate bumper guards, bumper plates, tail doors and other miscellaneous steel parts.

Here again all parts come from the polishing inspection ready racked being on cathode bars of the conveyor.

The cleaning cycle is:

(1) **High Pressure Spray Cleaner:**
Solution:
1 gallon of water.
2.5 ozs. DRI-SIL.
1/2% sod. resinate.
Temperature: Approx. 135°-145° F.

(2) **Rinse.**

(3) **Soak Cleaner:**
Solution:
1 gallon water.
2.5 ozs. DRI-SIL.
1.0 oz. caustic.
2% sod. resinate.
Temperature: 190° F.

(4) **Rinse.**

(5) **Electric Cleaner (Cathodic):**
Solution:
1 gallon water.
2.0 ozs. DRI-SIL.
1% sod. resinate.
Temperature: 160° F.
Current Density: Approx. 35-40 amps. per square foot.

(6) **Rinse.**

followed by a cathodic sulphuric acid pickle (10% H_2SO_4) with the wetting agent DUPONOL—5 lbs. to 1000 gallons of solution, then copper plate, spray rinse and nickel plate:

SOLUTION:

1 gallon water.
Nickel (as metal) 10 ozs.
Nickel chloride 6 ozs.
Boric acid 5.5 ozs.

ADDITION AGENTS:

No. 1 or Red Top as a primary brightener varies between 0.4 and 1.0 gram per liter to be determined by individual installation—increase permits higher current density.

No. 2 containing zinc and organic material—zinc maintained between 0.16 and 0.32 grams per liter, preferably at the higher figure, which increases the brightness.

Both brighteners are analyzed and controlled in the bath and the amount of non-pitter determined by their stalagmometer:

Time: 40 minutes.
Temperature: Very wide but for any organic material 145° F. should be top limit, in my opinion.
Current Density: 35-40 amps. per square foot.
pH: 2.0 to 2.2.
Filtration: Continuous.

Note that for such a large gallonage with its correspondingly large work area being continuously plated, that additions for brighteners and pH adjustments are controlled to drip continuously since by large periodic additions, sudden changes are caused which would generate a streaky plated condition.

After nickel plating the parts are rinsed and hand nickel colored on 16″ buffs running at 1200 r.p.m., partly to cover any remaining polishing marks and to impart a uniform lustre, since some trouble with grayness in low current density areas and recesses persists, which is not entirely overcome by agitation although this helps considerably.

Very accurate control of all constituents is necessary to produce continuously successful work and after determination of the best limits for any particular job, variables must be closely maintained.

After nickel coloring all parts are chromium plated as follows:

To Chromium Plate:

(1) Electro-clean:
1 gallon water.
1 oz. DRI-SIL.
2 ozs. soda ash.
1% sodium resinate.
Temp.: 150°-165° F.
Current density: 25-30 amps. per square foot.
(2) Rinse—cold water.
(3) Acid rinse—sulphuric 3% by volume.
(4) Rinse—cold water.
(5) Chromium plate.
(6) Two air agitated rinses.
(7) One hot water rinse, air agitated.
(8) Inspection (No chrome color).

HARSHAW TRIPLE X

The final bright nickel to be considered is operated by us in a 2200 gallon semi-automatic tank with reversing mechanism and plates steel, brass and zinc base die castings, which divergence requires different cleaning cycles.

Cleaning Die Castings:

(1) Soak for approximately one minute in a mixture of 10 parts naphtha with 1 part Oakite No. 7 emulsifying agent.
(2) Hot water spray rinse.
(3) Electric clean (cathodic):
Water—1 gallon.
Tri sodium phosphate—8 ozs.
Sodium resinate—1/2 of 1%.
Current Density: 40 amps. per square foot (minimum).
Temperature: Boiling.
Time: 15 seconds.
(4) Hot water spray rinse.
(5) Acid dip 5 seconds in 20% sulphuric acid.
(6) Rinse.
(7) Reverse cyanide 3 to 4 seconds, in a solution of:
Water—1 gallon.
Caustic soda—0.5 ozs.
Sodium cyanide—5.0 ozs.
(8) Cyanide copper plate (0.0003" thick):
Copper 1.5-2.0 ozs. per gallon.
Free cyanide 0.4-0.6 ozs. per gallon.
Carbonate, approx. 4.0 ozs. per gallon.
Rochelle salts 4.0 (maximum) ozs. per gallon.
Temperature: 145° F.
Time: 8 minutes.
(9) Spray rinse.
(10) Dilute H_2SO_4 dip.
(11) Rinse.
(12) Spray rinse.

Cleaning Steel:

(1) Solvent clean as for die castings.
(2) Soak.
(3) Rinse.
(4) Electro clean (as for Nibrite).
(5) Rinse.
(6) Acid dip in 20% sulphuric acid.
(7) Rinse.
(8) Copper plate as for die castings.

Cleaning Brass:

(1) Electro clean (as for Nibrite).
(2) Rinse.
(3) Reverse clean:
1 gallon water.
10.0 ozs. per gallon soda ash.
Time: Approx. 2 seconds.
Temperature: 190° F.
Current Density: Approx. 40 amps. per square foot.
(4) Rinse.
(5) Acid dip (dilute sulphuric acid).

The Triple X nickel is very brilliant, even more so as the thickness of deposit increases and no nickel coloring is required, nor is chrome coloring usually necessary which eliminates one re-racking:

SOLUTION:

Water—1 gallon.
32 ozs. single nickel salts.
4.5 ozs. nickel chloride.
5.0 ozs. boric acid.
Brightener: May be easily controlled by analysis.
More is used on dull copper than on polished brass.
Time: 10 minutes for brass—30-40 minutes for steel and die castings.
Temperature: 115°-130° F.
Current Density: Approx. 30 amps. per square foot.
Bright Range: 5-40 amps. per square foot.
pH: Very wide—from 2.5-3.7; recommended 3.2-3.7.
Filtration: Must be very particular; especially to keep out greases and buffing dusts.
The pH should be raised by adding approximately 1.5 lbs. plastic nickel carbonate per 100 gallons sol., used in thin paste form and stirred, and then solution decanted and filtered periodically.

With this Triple X bright nickel an activation is necessary before chromium plating to avoid a gray plate and while essential here, the method is rapid and efficient on all types of nickel previous to chrome plating.

SOLUTION FOR ACTIVATION:

Water—1 gallon.
Sodium cyanide—10.0 ozs.
Single nickel salts—0.48 ozs.
Time: Make anode for 1 second.
Reverse by D.P. D.T. switch.
Make cathode for 6 seconds.
Current Density: 8-10 volts (probably at least 30 amps. per square foot —good gassing necessary).
Temperature: Room temperature.

This covers our bright nickel plating procedure and I shall be glad to attempt answers to any questions you may care to ask.

MR. FULFORTH: I would like you to explain about the use of Korolac.

MR. OVERCASH: We design and make all our racks. After the rack is built up, it is cleaned in carbon tetra chloride and dipped 3 or 4 times in the Koralac. We then wrap the rack with a cotton tape, then dip until the coating becomes glossy. We keep our total solids in the Koralac around 8%. We like Korolac very well. It resists chrome very well and keeps its elasticity even after much use.

MR. NELSON: Do you find that pits in nickel come from the current density?

MR. OVERCASH: No, I do not believe so. With the use of

non-pitting agents which are used in the bright nickel baths. We have no trouble with pitting.

Question: Is bright nickel more sensitive to impurities like copper and iron than a regular gray nickel?

Answer: From my experience I have not had any trouble with those two elements in the baths, in amounts which you would get under ordinary plating conditions.

Question: How fast does work progress through nickel tank?

Answer: In McGean bath where we deposit .001", nickel work travels approximately 1-1/3 feet per minute.

Question: How thick a nickel deposit can you get on brass and still do no coloring?

Answer: In the Triple X bath, the thicker the deposit the brighter it will be. I would say .001" on brass and still have a smooth clear deposit.

Question: Can you activate in recesses?

Answer: Yes.

Question: What is the life of activator?

Answer: That question is difficult to answer. I would say a week of steady use would be an average life. The amount of chrome that gets carried back sometimes decreases its life.

Mr. Fred Fulforth our newly elected 2nd Vice President received a letter from one of our members residing in Paris. Here is the letter in part:

Fontenay-Sous-Bois le 28 April, 1938.

Mr. Frederick Fulforth,
Roslyn, Pa., U. S. A.

Dear Sir:

I thank you very much for your kind letter, which shows me that the A.E.S. is interested even in its farthest members.

Certainly I read the MONTHLY REVIEW with great interest, both on a scientific and industrial, and also on a human point of view, because it shows me that on both sides of the Atlantic Ocean all of us have the same tasks, the same struggles, and also the same joys in life. Allow me first to assure you that our American friends must not judge France after the political difficulties which are brought out by the newspapers. We certainly have our troubles, but life is still very enjoyable here, and there is a great deal of work done.

I should like very much to come once to U. S. A., but must wait till business is somewhat better in this country.

Believe me, dear Sir, yours very sincerely,

RENE GRAUER
Manager of "Grauer & Weil"
76 Bd. Richerd-Lenoir, Paris.

P.S.—Naturally I should enjoy very much a visit of A.E.S. staff or members on their trip to France.—R. G.

Rubber Linings - *An Important* Factor *in the* Electroplating Industry

Resistance to chemicals and insulating properties are the prime characteristics. No "poisoning" of solutions. A new hard rubber with improved physical properties.*

BY DR. H. H. HARKINS

In Charge of Rubber Lining Development, United States Rubber Products, Inc., New York

THE application of rubber to chemical equipment is a relatively new development in the rubber industry. People began the real use of rubber on chemical equipment about fifteen years ago, and its use in this connection has steadily increased.

As you may suspect, there are places where it can be used successfully and other places where it cannot. In those places where rubber is applicable we have the problem of fabricating a specific rubber compound best suited for the purpose. Every time rubber is used on chemical equipment, this special problem must be considered. Therefore, it is highly important for the rubber manufacturer to know the conditions under which rubber is to be used in order that the most useful type of rubber compound may be supplied. Much difficulty is encountered in practice because insufficient information concerning operating conditions is given to the rubber manufacturer.

Rubber has been used successfully as a lining for both wood and steel tanks. Due to the fact that steel is a standard material, easily fabricated to any size or shape, the use of rubberized steel equipment is becoming increasingly popular. When we consider the enormous amount of steel used in the chemical industries where it is exposed to severe corrosive influences, we can readily appreciate the advantages of rubber covering. An important instance is the pickling of steel, in which rubberized

*Read before the Detroit Branch of the American Electro-Platers' Society, April 1, 1938.

tanks are widely used. Such equipment, under many conditions, can be used indefinitely without serious disturbance from "Old Man Corrosion." Not only will rubberized equipment stand up, but it will also prevent contamination of product and permit all-around clean operation. In the numerous cases in which cleanliness is of vital importance for successful manufacture, rubber is often the solution to the problem.

CHEMICAL RESISTANCE

Inorganic bases such as caustic soda do not corrode iron or steel but the solution will pick up iron and become contaminated. For this reason, it is necessary to apply a protective coating to the steel vessel. Rubber resists caustic satisfactorily and does an excellent job of preventing contamination when properly compounded. Rubber also satisfactorily resists most inorganic acids, principal exceptions being nitric, chromic and strong sulphuric.

As to plating solutions, rubber compounds can be provided which resist most plating solutions satisfactorily—except those baths containing chromic or nitric acid. However, the fact that a rubber lining will resist the plating solution satisfactorily does not mean that all the problems are solved. Certain rubber compounding ingredients seem to "poison" plating solutions and care must be taken to avoid them. The rubber lining in a plating tank must not only resist the solution; it must not give off "poisons" that will prevent good deposition. Also, it must remain a good insulator even though used under a hot solution. Once the lining becomes a conductor of electricity, trouble starts. A hard rubber lining as free as possible from the ordinary compounding materials and cured to give a dense compound, absolutely free from porosity, and highly water resistant, seems to be the best for most purposes. Even then, high temperatures and high current densities may cause some trouble. However, rubber is probably the best material available for plating work, since it resists acids, alkalies and hot water. There are very few coating materials with the right physical properties which have these desirable chemical properties.

The foregoing brief discussion on chemical resistance gives a

fair idea of the conditions under which rubber can be used with success. Let us see how rubber fits into the different classes of corrosion problems. *F. N. Speller* has divided corrosion problems into five classes or conditions under which iron or steel will deteriorate.

1. *Atmospheric corrosion.*

About 80% of the steel used falls in this class. Rubber has little utility here, as paint will do a satisfactory job. The steel may also be electroplated, especially if appearance is a factor. Certain rubber derivatives, like chlorinated rubber, are finding use in the form of lacquers or paints to protect steel under atmospheric conditions.

2. *Under water corrosion.*

Properly compounded rubber is excellent for preventing the corrosion of steel under water at atmospheric temperatures. The higher the temperature of the water, the shorter the life of the rubber cover, but hard rubber will protect steel at the boiling point of water very satisfactorily.

3. *Under ground corrosion.*

There is sufficient moisture, acid, alkali, and oxygen in the soil to cause severe corrosion of pipe used for carrying water, oil or gas. The corrosion of these pipe lines results in the loss of millions of dollars each year. Of the hundreds of coating materials tested, there are only a few which show promise. According to a recent article (J. I. E. C. March 1938, page 294), there are only two coatings which show real merit: one is an asphalt coating covered with a film of celluloid or nitrocellulose plastic. The other is a coating of rubber.

4. *Chemical corrosion.*

This includes corrosion of steel by solutions and vapors, acids, salts, bases, etc. The rule to remember in applying rubber is to keep it away from concentrated solutions of strong oxidizing acids such as nitric acid or chromic acid; also to avoid hot oils which make the rubber swell and disintegrate. Outside of these

limitations, rubber may be considered for any chemical or aqueous solution up to temperatures as high as 212° F.

5. *Electrolytic corrosion.*

Rubber is a good insulator, and this property coupled with its chemical resistance, makes it valuable as a lining for tanks through which an electric current passes. If the solution is hot, it is highly important to select hard rubber compounded for maximum resistance to diffusion of water vapor through it.

6. *Chemical corrosion plus abrasion.*

This is really a sixth type of corrosion problem which may be included in this discussion. It arises wherever we have an acid or salt solution carrying particles in suspension when the solution is agitated. Since soft rubber is highly resistant to abrasion, it is obvious that rubber is very useful in chemical engineering problems of this type.

Construction No. 1 (*hard rubber—steel*) is sometimes applied to small metal parts or to larger parts not subjected to sudden temperature changes. The reason for this is that hard rubber has a tendency to come loose from the metal. Construction No. 2 (*hard rubber—soft rubber—steel*), No. 3 (*soft rubber—hard rubber—soft rubber—steel*), and No. 4 (*hard rubber—semi-ebonite—steel*) are widely used. If we compare these four constructions we find their resistance to impact to be as follows:

No. 1 is best as long as it stays on the metal.
No. 4 is the best over a temperature range.
No. 3 is next.
No. 2 is poorest.

This statement of the performance is correct, if we strike the pieces on the rubber side. If we strike the construction on the metal side and bend it, we find a different set of relations.

Going back now to construction No. 1, I wish to discuss what the ideal lining would be. Hard rubber next to steel is considered impractical, or at best a bad risk where a large steel surface is concerned. Let us consider, however, the enormous advantages which would be gained if hard rubber had a few different properties:

1. Suppose it had the same co-efficient of expansion as steel. We would then not encounter the difficulty mentioned, namely, that it strips from the metal when the temperature is suddenly changed.

2. Suppose it had a reasonable stretch, and were strongly bonded to steel. The difficulty encountered would not then exist. The temperature could then be changed suddenly without danger of stripping from the metal.

A NEW HARD RUBBER LINING

There is experimental evidence to indicate that it is possible to produce a lining with these desirable properties:

(a) The lining is made by compounding hard rubber so that we obtain, in effect, a flexible ebonite. Its chemical resistance is fully equal to ebonite and in some respects better.

(b) The lining will adhere directly to steel with a very firm bond.

(c) The lining will withstand sudden temperature changes without stripping from the metal. Experiments have shown that small metal parts covered with this material and bonded to metal would withstand a sudden change in temperature from 212° F. to —20° F. without coming off the metal, whereas ebonite or semi-ebonite would strip completely from the metal under the same conditions.

(d) The lining is somewhat softer than the ebonite and would therefore, have less resistance to penetration by sharp objects. The destruction of rubber by gouging, however, has been greatly over-emphasized. If there is any real mechanical action, or gouging to which the inside of a rubber lined tank is subjected, it is customary to place a sheathing of brick over the rubber to protect it from sharp objects.

(e) The lining has no objectionable odor, and properly compounded, does not impart appreciable color to clear solutions in contact with it.

(f) The lining is flexible over a wider range of temperatures than semi-hard rubber. It can be bent suddenly at low temperatures (—20° F.) without cracking. Experimental tanks

carrying this lining have been struck on the outside and the metal bent through an appreciable angle without cracking the lining. The tank will stand this abuse at ordinary temperatures, and in cold weather when a tank is likely to be damaged by a mechanical blow during shipment, or after it is in use.

(g) Where the sixth class of corrosion problem (chemical corrosion plus abrasion) prevails, a soft ply of rubber can be placed over this special lining to take care of the situation.

(h) The lining resists oxidation as well or better than ebonite.

(i) Its resistance to chemicals is fully equal to ebonite.

(h) Its resistance to penetration by water vapor is fully equal to ebonite.

(k) Electrical properties are equal to ebonite.

The properties of this new material are such as to make it very promising in the chemical field. It should be of particular value in plating tanks.

At the present time this new lining material is in the experimental stage, and some difficulty has been encountered in bonding it firmly to metal. Further study of it is necessary, and is in progress. I am mentioning the properties of this material and the construction to show that by changing the properties of ebonite we may hope to arrive at a homogeneous, one-ply lining (or at the most two plies) having the long desired properties—high chemical resistance and moderate flexibility over a wide temperature range. We would come one step closer to the ideal lining material and eliminate the necessity of complex two or three ply constructions. Also, in hot solutions the homogeneous lining would have the obvious advantage that the lining consists entirely of material which has maximum chemical resistance. This discussion illustrates the objectives which we are striving to attain in the field of rubber lined chemical equipment.

LINING A TANK WITH RUBBER

The first step is to see that the tank is built to specification. The surface is then sand-blasted to remove rust, scale or grease. The adhesive is then applied. The rubber compound is cal-

endered to the required gauge, using several plies calendered together to insure freedom from pinholes. This sheet of calendered rubber is then carefully rolled onto the surface to be covered. Care must be taken to see that no air is trapped between rubber and metal, as this will result in a defect in the cured lining. After the lining is in place on the tank, it should stand at room temperatures for 24 to 48 hours before curing in order that the solvent used in cementing it down may evaporate. If solvent is trapped in the rubber, it is likely to cause porosity in the cured lining. The tank is then placed in a vulcanizer and heated under steam pressure at a temperature sufficient to vulcanize the lining. During this heating operation the lining is not only vulcanized but becomes firmly bonded to the steel.

After the tank is cured it is checked with an electrical test to make certain that the lining is free from porosity or other flaws. No rubber lined tank is allowed to leave the factory until it passes this electrical test. If a defect is found, it is repaired.

The above discussion refers to tanks cured under pressure. It is also possible to apply either soft or hard rubber to tanks without using temperatures higher than 212° F. Soft rubber may be successfully applied at room temperature.

In a typical installation a plating tank is lined with hard rubber 3/16″ thick. There is an additional layer of soft rubber 1/8″ thick around the top of the tank and on top of the anode bar supports and clips. This layer of soft rubber serves to prevent mechanical abuse on the edge of the tank and further insures that the anode bar supports will tolerate the required load.

ADVANTAGES OF RUBBER LINED TANKS

The chief advantages of rubber lined tanks for plating solutions are:

1. They cut down current losses and enable a constant current density to be maintained.

2. Properly compounded rubber will not contaminate the plating solution. This is of vital importance in securing the proper type of deposit.

3. When a rubber lined tank is injured, corrosion will be confined to the point of injury. The corrosive solution will not

creep between the rubber and metal. Moreover, the injured portion can be easily repaired on the job without difficulty.

4. Rubber lined tanks can be used successfully for a long time, at little or no maintenance cost.

Rubber is applied to tanks in sheet form. In the case of metal parts with odd shapes or with many holes, such as plating racks, it is necessary to cover the parts by a different method. Complicated metal parts can be covered by the latex dip method. In this way a uniform layer of rubber can be laid down on any sort of metal part. While we have had no extensive experience with latex coated racks, we have had a number of encouraging reports on racks coated with latex hard rubber.

The value of rubber in plating equipment is dependent on its chemical resistance and its electrical properties. We may now consider a few facts concerning the electrical properties of rubber.

Obviously when using rubber in contact with a solution through which an electrical current is passing, the electrical property of the freshly cured dry stock is not what really counts. The lining, in order to function properly, must remain a good insulator after soaking in the plating solution. If the rubber is wet through it will become a conductor and therefore, will "plate through." While in general this does not happen, it has happened, and the trouble will occur more readily with higher operating temperatures. This problem deserves further study.

It appears that hot water is not the only factor causing rubber to lose its insulating properties in a plating tank. Certain chemicals added to plating baths, such as naphthalene and phenol sulfonic acid would tend to cause rubber to become a conductor. These chemicals are soluble in water and slightly soluble in rubber. If rubber absorbs one of these acids, it is obvious that it will then be a poor insulator. Hard rubber compounds can be supplied, however, which will satisfactorily resist baths containing the sulfonic acids.

Many platers have felt that plating through is the result of defects in the rubber; defects present when the tank is received. While it is a fact that porosity of the lining would cause immediate plating through, I am referring to the fact that the lining can become a conductor even though it is free from

physical defects. I believe that the trouble can be minimized or eliminated entirely by the following precautions:

(1) Start with a rubber which is as free as possible from non-rubber constituents; i.e., water solubles. In other words, the place to start is with the latex as it comes from the tree.

(2) Use little or no filler or select a filler which will render the stock more water resistant.

(3) Cure to a rubber as hard and dense as it is practical to make; or else select a plasticizer for hard rubber which is fully as good as ebonite with respect to electrical properties and water resistance.

By taking these steps, I believe it will be possible to reduce plating through to a minimum, even at operating temperatures as high as 180° F.

Since rubber resists acids, alkalies and water, it is useful not only in the plating tank, but in the wash and acid tanks preparatory to plating.

The technique of lining tanks with rubber is being constantly improved. Due to the availability of new synthetic rubber-like materials and aided by further studies in compounding, it should be possible to effect further improvement in rubber compounds for specific uses.

CROWN RHEOSTAT AND SUPPLY CO. WILL PRESENT CUP FOR BEST BRANCH PAPER.

In pursuance of the action of the delegates at the 1938 Convention in adopting the Resolution of the Paper Prize Award Committee relative to a prize for Branch papers, the Committee is pleased to inform you that the silver cup will be presented by Mr. George A. Spencer of the Crown Rheostat and Supply Company and will be known as the Sam Heunerfauth Award in recognition of Mr. Heunerfauth's early admission into the Society and his untiring efforts in the plating industry.

The first awarding of this prize to run concurrently with the Gold Medal prizes, which will be awarded at the 1939 Convention covering the period from June 1, 1938 to June 1, 1939.

Respectfully submitted,

C. E. CLINDININ,
Chairman.

Convention News Briefs

The 1938 Convention will go down into A.E.S. History as being one of the best ever held. From start to finish everything seemed to click in perfect harmony. Our heartiest congratulations to the chairman of the Milwaukee Convention Committee and his workers for the success of this year's meetings.

Speaking of workers, one of the busiest men in Milwaukee was our old friend, Dan Wittig. A few years ago Dan was made an honorary member of the A.E.S. The old boy seems to be renewing his youth.

We wish we could name all the workers personally, for the fine part they played and for their courtesy and cooperation. We must mention Bob Steurnagel, the treasurer, Dexter Rhodes who worked at the registration desk at all hours, Bob Goodsell, the publicity man, Henry Burnitzke, the exhibits king, Al Hermansen, secretary of the local branch, the two Sheehans, Vinc and Eddie. The latter made a nice speech at the opening business session which shows the interest our younger members are taking in the A.E.S. Ray Goodsell the general chairman may well be proud of his corps of assistants.

Our two Canadian Branches were well represented. Walter Barrows the esteemed member from Toronto was made an honorary member. This spontaneous tribute was richly deserved as Mr. Barrows is loved and respected by all who know him. The president of Toronto Branch, Mr. J. Acheson, also attended and got a glad hand during his stay.

From Montreal the one and only John Feeley was very much in evidence. John's good nature and ready Irish wit make him popular wherever he goes.

St. Louis Branch had a good delegation present. Past Supreme President of the A.E.S., Mr. H. H. Williams renewed old acquaintances. Secretary McGinley of St. Louis Branch and Mrs. McGinley, Burton G. Daw and Mrs. Daw, and Messrs. Miller, Lubken, and Humbrecht, we'll be looking for you all next year at Asbury Park. We missed Ed. Musick.

The New Haven Clock Co. donated 2 chime clocks, which were raffled off at the banquet. Joan Trombour Wiarda had charge of the sale of tickets. $101 was turned over to Mr. Phillips, Chairman of the Research Committee as a result of Mrs. Wiarda's efforts. This is a nice boost for our research finances.

Los Angeles Branch sent six cases of oranges to the members attending the Milwaukee Convention. These were distributed during the International Fellowship Club's annual event. Many thanks to our Los Angeles members for their thoughtfulness and expression of good will.

The Educational Sessions were well attended. All papers presented were instructive and interesting as the discussions proved. With an air conditioned room, loud speaker facilities, and a noticeable absence of interruption from outside every speaker could be heard distinctly. These combined features should prevail at all future conventions as authors presenting papers are entitled to every consideration such as was provided this year. The presiding officers at each educational session also helped considerably in making the sessions interesting, by keeping "whispering out loud" down to a minimum by the audience.

What a ball game that was at Waukesha Beach! With Rudy Hazucha pitching for the westerners there wasn't much opposition. Rudy had perfect control, so much so that even the two umpires, Harold Faint and Jack Geissman couldn't give the game to the east. Dr. Young's home run with the bases full was the redeeming feature for the losers. The final score was 17

to something or other. But wait! next year the easterners will be playing at home so watch out, you western sluggers.

The Hanson-Van Winkle-Munning official convention news made its appearance each morning as usual before breakfast. This publication has now become a very welcome addition to the convention program, and is fully appreciated. Mr. Yerger, Mr. Tyson, and all who have had the publishing of this paper in hand deserve the sincere thanks of our members and friends. May it long continue to bring us those personal paragraphs which help us to know who's who and keep us in touch with the convention activities from day to day.

The International Fellowship Club's affair on Monday night was a grand success. Everyone enjoys this event each year. Tom Trombour of the *Metal Industry*, the secretary of the Club, puts a lot of work into this festive occasion and seems to enjoy it. Thanks Tom! it looks like a lot of work in store for you next year at Asbury Park. By the way, our good friend Oliver Sizelove, is the new president of the club. Oliver is a member of Newark Branch and is connected with the Fred Gumm Chemical Co. The new president doesn't like compliments regarding himself, but we don't mind saying in all sincerity that he is one of the best liked members of the A.E.S. from coast to coast.

We feel sorry for our retiring president, A. B. Wilson; he didn't have a chance to play golf all the time he was in Milwaukee, his executive duties kept him so busy. Maybe he will take some of the boys for a ride next year.

What a wonderful display of finishes there were in the Exhibit Room! Nearly every finish one could mention was presented. Seventeen of our branches were represented. This feature should receive every encouragement at all future conventions.

Mr. Hogaboom's panels which were presented to the audience as he read his paper, had over 300 different finishes consisting of Bronze, Lacquer, Enamel, and every kind of electrodeposit. It was a novel idea and represented weeks and weeks of hard work, getting these samples of finishes together.

Leaving Milwaukee for the east we travelled part of the way with Mr. and Mrs. Louis Lougee of Waterbury, Conn. We believe Mrs. Lougee spoke volumes when she said, regarding the convention, "that the ladies had a wonderful time, and that out of town guests enjoyed every minute of their stay in Milwaukee."

Now that the Convention is over let us do all we can to boost our Society, increase its membership, be loyal to the newly elected officers, and attend all the meetings of our Branch when we get together in the Fall.

Plan now to attend the 1939 International convention at Asbury Park, N. J., under the direction of Newark Branch, A.E.S. This will be the greatest Convention ever held in our history. Bring your whole family and plan to attend the World's Fair in New York City, only 50 miles away.

For information write Horace H. Smith, 208 N. 3rd St., Newark, N. J., General Chairman of the Convention Committee.

Business and Social News

BRANCH NEWS

Educational Activities

AMERICAN ELECTRO-PLATERS' SOCIETY

PROVIDENCE-ATTLEBORO BRANCH

The Providence-Attleboro Branch held its regular business meeting at Narragansett Hotel, Monday May 16, 1938, at which the officers were elected for the ensuing year; also, as we were unable to learn that any member of the Branch was to attend the Convention, it was voted to give our Proxy to Boston Branch.

A paper, written by Mr. Joseph Smith and intended for the Convention, was read and it was voted that we would rather have it printed in the REVIEW, at some future date.

Arthur Wood presented the Branch a nice Question Box at this meeting, and we are hoping to have some interesting times when the questions get hot.

On Monday May 23, a joint meeting of the Branch and The New England Mfg. Jewelers Association was held in the Lecture Room of the R. I. School of Design. Dr. Louis Weisberg, for the Branch, gave a talk on Bright Nickel-Plating, and Dr. Wm. Blum, for the Jewelers Association, talked on "Specifications and Testing of Electro-Plates."

Our Honorary President, Dr. Albert W. Claflin, was the presiding officer. It is needless to state that we had a wonderful meeting. There were nearly 200 present.

I am very sorry to have to report the death of one of our Charter members, Mr. Gavin J. Tyndall.

JOHN ANDREWS, *Sec.*

BRIDGEPORT BRANCH

The regular monthly meeting of the Bridgeport Branch was held on June 3 at 8:30 p.m., in the Chamber of Commerce Rooms in the Stratfield Hotel. Joe Sterling, president, called the meeting to order.

The roll call of officers was read and all were present.

The minutes of the last regular meeting were read and accepted.

The Sick Committee reported George Karl was ill with the Grippe.

The Sick Committee appointed for the following year consists of Eugene Phillips and William Flaherty of Bridgeport, and Herman Brown of Stamford, who ask to be informed when any of the members are sick.

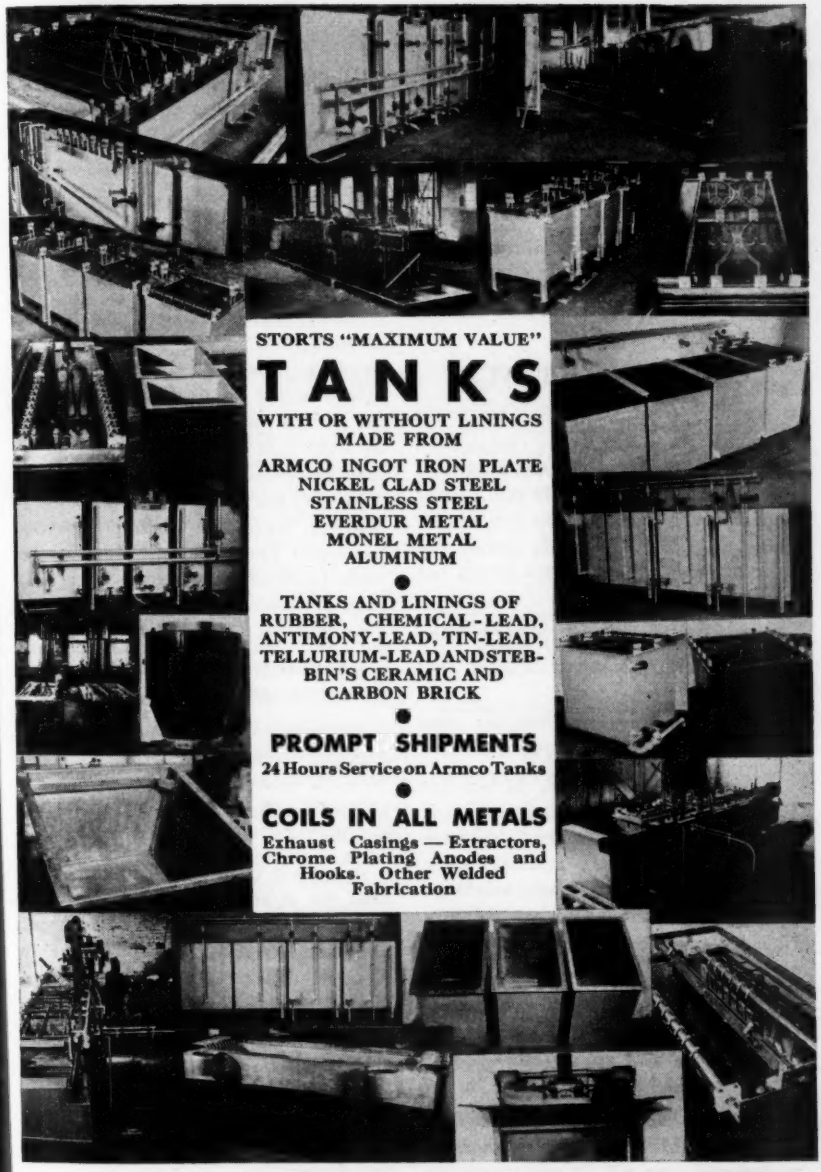
Communications: Railroad fares to the Milwaukee Convention were read and turned over to the delegates to the Convention.

The Chair appointed the following for an Outing Committee: Ray O'Connor, Chairman, assisted by George Karl, Eugene Phillips, George Wagstaff, John English, Joe Sterling, Wm. Ehrencrone, and Walter Meyer. Watch for the date for an outing to far surpass any other of the local branch, planned by this committee, the place to be announced in the near future.

It was voted to donate $25.00 to the Research Fund.

Bills against the Branch, none.

The treasurer's report was read and accepted. Receipts of the session were $26.00.



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The Educational Session was conducted by the librarian, Dr. Walter Meyer, who spoke on "Silver Plating and the Rochelle Copper Solution." Questions were asked and answered by members present.

The motion was made and seconded to adjourn at 10:45 p.m.

WM. FLAHERTY, *Sec.*

ST. LOUIS BRANCH

Regular meeting of the St. Louis Branch A.E.S. was held Friday, June 3, 1938 at the Central Y.M.C.A. Dinner was served at 6:30 p.m. After dinner Mr. Williams made the motion that Mr. H. J. Richards install the new officers, which he did in his old time way.

Mr. Rees Ricketts then opened the meeting with roll call of officers. All were present.

Minutes of previous meeting were read and after correction, approved.

Letter was read from Milwaukee Branch in regard to the Convention. Mr. Musick of the Booster Committee reported that about 8 members from St. Louis would go. They would go by way of Chicago and get there in time for the meeting, and then leave on Sunday for Milwaukee.

Mr. Chas. Schwartz from Evansville, Ind., was elected to membership in St. Louis Branch. Welcome Mr. Schwartz and hope to see you in St. Louis!

Mr. Paul Miller and his brother attended our meeting. Hope to see you often at our meetings, Paul.

Meeting was turned over to J. Vogt, our Librarian. pH of Nickel was discussed and also copper plating. Some samples of Bright Zinc were passed around, mainly to show the throwing power.

Nothing further, meeting adjourned, subject to the call of the president.

C. T. MCGINLEY, *Sec.*

NEWARK BRANCH

The regular meeting of the Newark Branch A.E.S. was held on Friday evening June 3, 1938, at the Club Room of the Hotel Douglas, Newark, N. J. The meeting was called to order at 8:30 p.m. The following officers were present: John Kotches, president; Jack Shamis, vice-president; George Wagner, secretary; Nelson Sievering, treasurer; Paul Oldam, librarian; Stephen Leshnick, sargeant-at-arms; William Harrison, Harmon S. Hunt, and George Reuter, Trustees.

The minutes of the previous meeting were read and approved.

A communication was read from the Dayton Convention Bureau, asking Newark Branch to give their support to Dayton Branch for the 1940 Convention.

A request from Mr. Frank E. England for reinstatement was read and it was voted that the request be granted and Mr. England be reinstated to Newark Branch after receipt of his dues.

The Banquet Committee made its final report and they were given a rising vote of thanks for the splendid work they had done in making the Banquet a huge success both socially and financially.

Mr. Horace Smith stated that one of our oldest members and his wife would celebrate their golden wedding anniversary on July 4, 1938. That member is Mr. Philip Sievering, Past

Branch and Supreme President. The secretary was instructed to send them a letter of congratulations for that event.

Mr. Smith brought up the subject of running a picnic, stating that he, Mr. Wagner and Mr. Sievering had investigated Galloping Hill Grove in Union, N. J., and found it to be a very suitable place for a picnic or outing. It was voted that Newark Branch hold a picnic in the above mentioned grove on Saturday, July 23, 1938.

Mr. Franklyn MacStoker and Mr. Ralph Ligouri, officers of the New York Branch, attended this meeting and our Chairman called upon them for some remarks. Mr. MacStoker expressed his appreciation for the assistance that Newark Branch has given him as an officer of the Supreme Body. Mr. Ligouri stated that the main reason for these visit was to get together with Newark Branch on their proposal of holding a joint banquet this coming year. He informed us that the members of New York Branch were very much in favor of our proposition and emphasized the remarks which Mr. Horace Smith made at a previous meeting in New York about neighboring branches holding joint banquets.

The committee on "Wetting Agents in Nickel Solutions" then read their completed paper to the Branch for their approval and it was unanimously agreed that the paper be presented at the Milwaukee Convention, as read.

Meeting adjourned at 11:00 p.m.

GEORGE WAGNER, *Sec.*

CHICAGO BRANCH

The regular monthly meeting of the Chicago Branch was held on June 11, 1938, at the Atlantic Hotel.

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President E. Stepka presided and all officers were present.

The newly elected officers were installed by Mr. O. E. Servis, and took their chairs for the ensuing year. Mr. G. Jelinek proxied for J. L. Nowak as he was not present.

The Branch was honored by the attendance of most of the Supreme Society's officers and many prominent members of the society. The meeting was a small convention in itself.

Our Supreme President, Mr. A. B. Wilson, Supreme 1st Vice-president, Mr. F. J. MacStoker, Supreme 3rd Vice-president, Mr. A. Fletcher, and our Executive Secretary, Mr. W. J. R. Kennedy, all had a few words to say.

Mr. F. J. Hanlon introduced all the visitors to the Branch and Mr. H. Smith invited all the members of the

Chicago Branch to the Convention in Newark, N. J., in 1939.

Mr. R. J. Seyl of The Technical Service Bureau, gave a very interesting paper on pH in electroplating solutions.

The meeting adjourned at 10:00 p.m. leaving the question box closed until July as the refreshments were ready to serve. The members of the society had a very sociable visit and the Chicago Branch's booster meeting of June 11, 1938, was a gallant affair.

M. H. LONGFIELD, *Sec.*

PHILADELPHIA BRANCH

The meeting was called to order by President Joe E. Underwood, who was presiding. Roll Call of Officers, one absent. Minutes of previous meeting read and approved as read.

Application of Mr. Ray Clark as an active member read; moved and seconded same be referred to Board of Managers for investigation; carried. Board of Managers reported favorably on application of Mr. A. E. Anderson; moved and seconded Mr. Anderson be elected as an associate member; carried.

Nomination of Officers: President, Joe E. Underwood; Vice-president, Fred Fulforth; Secretary-Treasurer, Robert E. Jackson, Jr.; Librarian, Eugene J. Zurback, Jr.; Board of Managers: George Gehling, Harry Snyder, Al Hirsch, Harry Keller, George Long. Delegates to the Supreme Convention: Joe E. Underwood, Fred Fulforth, Robert E. Jackson, Jr., Nat. Verrelle. Alternates to Supreme Convention: Harry Shelly, Harry Snyder, Paul Mentzer. Moved and seconded nominations be closed and a judge and two tellers be appointed and proceed to election of officers; also where there is no opposition for office, Secretary cast a ballot for same; carried. Judge, D. Robson; Tellers, J. M. Himes, and A. T. Harris. Election Board reported the following members elected: President, Joe E. Underwood; Vice-president, Fred Fulforth; Secretary-Treasurer, Robert E. Jackson, Jr.; Librarian, Eugene J. Zurback, Jr.; Board of Managers: George Gehling; Harry Snyder, Al Hirsch. Delegates to Supreme Convention: Joe E. Underwood, Fred Fulforth, Robert E. Jackson, Jr. Alternates to Convention of Supreme Society, Harry Shelly, Harry Snyder, Paul Mentzer. Moved and seconded the report of election board be accepted and election board discharged with thanks; carried. Auditing committee appointed as W. A. Reynolds, chairman, A. T. Harris, Joseph Raymond, to audit Sec.-Treas. books and report at June meeting. Transfer of Mr. D. W. Pritchard to Chicago Branch as associate member and Mr. C. L. Etchinson to Baltimore-Washington Branch as active member, moved and seconded transfers be granted; carried.

A very kind, considerate and friendly letter was received from our good member Mr. Rene Grauer of Paris, France. The letter was read by Mr. Fred Ful-

WANTED

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forth; moved and seconded Mr. Fulforth answer the letter and send the Branch's appreciation and salutations to our Mr. Rene Grauer's interest shown for Philadelphia Branch; carried.

Moved and seconded Branch hold a regional meeting at Lancaster, Penna. in September and the president appoint a committee for same; carried.

Moved and seconded Mr. H. Leroy Beaver be reinstated as an associate member; carried. Under good and welfare the subject of cleaning was discussed and there was a very good exchange of experiences which held those present on edge and there was not one who did not enter into this subject.

There being no further business, the meeting adjourned until June 24, 1938.

ROBERT E. JACKSON, JR., *Sec.*

MILWAUKEE BRANCH

The regular monthly meeting of the Milwaukee Branch was held June 2, 1938, at the Republican Hotel. All of the officers were present with the exception of the Vice-President Vincent Sheehan who is confined to the hospital.

Minutes and the financial report of the previous meeting were read and accepted.

President Ray Goodsell, as one of his last official acts, called upon Mr. Frank Hanlon of the Chicago Branch, to deliver a few remarks. Mr. Hanlon was a surprise guest and he gave an enlightening little talk and also assured us that the Chicago Branch would have a good representation at the Convention.

The installation of the newly-elected officers was then conducted by Mr. William C. Geissman, in an appropriate manner. The officers for the coming year are: Dexter Rhodes, President; Rodney Olsen, Vice-president; Robert Goodsell, Secretary-Treasurer; Henry Bornitzke, Librarian. The Board of Managers consists of Jack Geissman, Robert Steuernagel and Jos. Jagemann.

There being no further business, the meeting adjourned at 9:45 p.m. and was followed by refreshments.

ROBERT B. GOODSELL, *Sec.-Treas.*

DETROIT BRANCH

Minutes of the meeting of Detroit Branch of A.E.S., held Friday evening, June 3rd, at Hotel Statler. Mr. A. B. Wilson presided. The minutes of the previous meeting were read and approved. The correspondence was then taken up and there were several letters from transportation companies offering rates to Milwaukee. As no one seemed to be interested, there was nothing doing on this.

The report from the secretary-treasurer was read and o.k.'d by the Board of Managers who had previously audited the books of the treasurer and

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found them in good shape and pronounced them o.k.

Report of the exhibit committee was made. Mr. B. F. Lewis reported progress and stated that there would be an exhibit at the Milwaukee Convention representative of Detroit Branch and work finished in this locality.

The membership report by Mr. Eichstaedt was to the effect that new members during the year were not nearly up to expectations but that we had not been idle and we did the best we could. At the end of the year 1937, we had 126 members. We have had several transfers and suspensions but fortunately we have had no deaths in our membership this year. At the present time we have a membership of 144 showing a net gain of 17 members for the fiscal year.

The question of a picnic for the coming year came up and it was decided that we should hold our picnic Saturday, Aug. 6 at Sandy Macs Golf Course, 8415 Tireman Ave.

The question of a winter meeting or, in other words, educational meeting, dinner and dance came up and it was decided to postpone action until the first meeting in September.

Mr. Hoeffer of the A. T. Wagner Company then read the paper which the Committee has been working on to be read at the Milwaukee Convention as being presented by the Detroit Branch. The title of the paper is "Electro-Plating Solves Manufacturing Problems." The idea of Mr. Hoeffer reading the paper was to get all the criticism and corrections and different angles from the members of

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The cups, now cleaned with MAGNUS 94XX for 1½ minutes and barrel plated with cadmium for 10 minutes, have a good covering of cadmium on the inside as well as the outside.

Metal working and finishing manufacturers are asking for the details of these new MAGNUS X and XX Metal Cleaners. (X sudsing type, XX non-sudsing type). Write for complete information today.

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MAGNUS CLEANERS

the Branch so that he could rewrite it and present it as having been authorized by the Branch. Mr. Hoeffer has done a fine job. The committee should be congratulated on getting up such a fine paper. The paper will be read at the Convention in Milwaukee.

There was a moving picture presented by the Chevrolet Motor Division of the General Motors Sales Corporation and it was very interesting as well as educational. A very pleasant twenty minutes to half hour was taken up with this and every one enjoyed it.

Mr. Wilson who is the retiring president then thanked the members for coming out and supporting officers who provided good programs during the year. He also thanked Mr. Nankervis for acting on the entertainment committee as chairman, also Mr. Eldridge as chairman of the educational committee, Mr. B. F. Lewis who handled the Question Box, and Mr. Beaubien as chairman of the Board of Managers and Mr. Wm. McCord for taking care of the program for our Annual Dinner Dance last December, Mr. Carl Heussner, Mr. Cherry, Mr. Southwick for their able assistance as well as Mr. Eichstaedt in keeping up the work of the secretary-treasurer. He also stated that he enjoyed the work during the last two years and wished to state that it was a lot of fun and said thanks to every one. He then turned the meeting over to Colonel Joseph Hansjosten who installed the officers for the coming year: James Higgins, President; Carl Heussner, Vice-president; T. C. Eichstaedt, Secretary-Treasurer; B. F. Lewis, Acting Librarian; Charles Beaubien, Wm. McCord, Wright Wilson, Board of Managers.

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The Colonel then impressed upon each officer who was elected that it was his duty to do his utmost to uphold the integrity of Detroit Branch of the A.E.S. The Colonel did a good job of installing the officers. He handled the situation as one who knows how. The Colonel was president of Detroit Branch five years and he is a past president of Supreme Society, in fact, the second past president.

Our new president, Mr. James Higgins, took the chair for the rest of the meeting. The first action was to appoint committees for the ensuing year. He again appointed Mr. Charles Eldridge as chairman of the educational committee, Mr. Cherry, chairman of entertainment committee. These men are to appoint their own assistants.

Mr. W. W. McCord made a motion and it was unanimously carried that the Society give a rising vote of thanks to the outgoing officers for the services rendered for the past year. Also a vote of thanks and a letter to the Chevrolet Motor Sales Corporation for the moving picture presented at the meeting.

THEODORE C. EICHSTAEDT, *Sec.-Treas.*

TORONTO BRANCH

The regular meeting of Toronto Branch was held on Monday, June 27. This is the last meeting until September.

All accounts were ordered paid, and the books made ready for the annual audit.

With correspondence being light, the meeting got well under way with President Acheson and 25 members ready to hear our delegates' report of the Milwaukee Convention. Mr. Smith being an able speaker held the members interested, although the report was given in a most unusual way, John Acheson and Walter Barrows chipping in what Mr. Smith left out.

Members were delighted to hear that Mr. W. Phillips had been elected Chairman of the Supreme Society for the next fiscal year. Also Mr. Walter Barrows being made an honorary member of the Supreme Society, an honor well merited with a great interest at heart for the electro-deposition of metals, and the American Electro-Platers' Society, an ambition to get to the top, along with the pep of the Canadian climate. Attending 25 conventions out of 26 is certainly a record hard to beat.

The new officers were installed and the customary report of receipts and expenses. Especially the expenses started the members wondering: How high is up?

The members expected a visit from Mr. John Feeley of Montreal Branch, but he didn't show up. The meeting adjourned at 10:45.

JAMES S. CAIRNS,
REVIEW *Cor.*

NEWARK BRANCH *will hold its* SIXTH

ANNUAL PICNIC

on Saturday, July 23, 1938

AT GALLOPING HILL GROVE, UNION, N. J.

Refreshments served
from 12 Noon till 9 P. M. Tickets $1.75
for Adults and $1.00 for Children. Games for ladies
and men. Also prizes for all winners.

PHILADELPHIA BRANCH

Meeting called to order by Pres. Joe E. Underwood, presiding. Application of Mr. Robert W. Etter as associate member referred to Board of Managers. Application of Mr. R. F. Clarke Sr. reported favorable by Board of Managers moved and seconded Mr. R. F. Clarke Sr., be elected an Active member of Philadelphia Branch, carried. Report of Executive Secretary moved and seconded same be received and filed, carried. Communication from A.S.T.M. be referred to the Executive Secretary and carried. Report of Sec.-Treas., read, moved and seconded same be received, and spread on the minutes and be published in Quaker City Reminder, carried. Report of Auditing Committee read, moved and seconded same be received and Committee be discharged with thanks, carried.

Pres. Joe E. Underwood gave a brief report on the work done by the branch and wished to thank the officers and members for their co-operation during the past year. Moved and seconded same be received.

Delegates reported a very successful Convention. Educational Sessions and shop visitations were very interesting. The Supreme Pres. A. B. Wilson is to be commended for the very able manner the Business Session was conducted. Milwaukee Branch should be complimented for the entertainment and picnic. The Good Fellowship Club should be given a hand for the able manner they conducted the Good Fellowship Club Evening entertainment, buffet lunch and dancing. Philadelphia Branch is again honored by having one of its members elected second Vice-Pres.

It was moved that the resignation of Captain A. Willink as a member of Philadelphia Branch be accepted with regrets, also recommendations of the Auditing Committee be complied with and published in the Quaker City Reminder, carried.

The following Committees were appointed: Banquet Committee Chairman, Mr. Paul Mentzer; Educational Chairman, D. Robson; Lancaster Meeting Chairman, Warren A. Reynolds; Transportation Chairman, John L. Nelson. A. M. Robson, G. Gehling, J. D. Dimon, also Board of Officers. There being no further business, meeting adjourned till September, the Board of Officers to function during the summer.

ROBERT E. JACKSON JR., *Sec.-Treas.*

MONTREAL BRANCH

The regular monthly meeting of the Montreal Branch took place at the New Carlton Hotel on Thursday, June 30th., with a large percentage of members in attendance.

The new officers having been duly installed and the usual business matters attended to, the members settled down to hear the report of their delegates to the Milwaukee convention. The story as presented by Messrs. Feeley and Jordon held the members keenly interested until a late hour. The news that Mr. W. Barrows of the Toronto Branch had been made an honorary member of the society was received with pleasure. The members were also glad to learn that each would receive a copy of the convention proceedings, and that the REVIEW in the future would publish new matter.

There will be no more meetings of this branch of the society until the month of September, when it is proposed to open the winter season with a

dinner at the New Carlton Hotel to be followed by an educational session. The subject matter of this session will be Rochelle Salt Cyanide Copper Solutions and members are requested to come prepared to pool their information on this subject.

JOHN T. CRONIN, *Sec.*

LOS ANGELES BRANCH

Minutes of the meeting of the Los Angeles Branch of the American Electroplaters' Society held June 8, 1938 at Rosslyn Hotel.

President John L. Merigold presided. Minutes and financial report of previous meeting were read and accepted. Bills were read and ordered paid.

The installation of the newly elected Officers was conducted by Mr. M. D. Rynkofs in a very appropriate manner.

The application of Mr. A. A. Sulzinger was read and accepted. Members voted to suspend Mr. Chas. Bessolo.

Mr. Don Bedwell and Mr. E. R. Holman demonstrated methods of analyzing Chrome solutions.

The Librarian found the following questions in the Question box:—

Q. What effect will lead lined steel tanks have on the nickel solution?

Ans. In most cases this type of tank is satisfactory.

Q. What would cause cold rolled steel anodes to dissolve in a silver strike solution?

Ans. The presence of Chlorine in the solution would cause iron to dissolve, however, this should not prove injurious.

Meeting adjourned at 11 P. M.

RAYMOND SOLIVAN, *Sec.-Treas.*

Detroit Branch, A. E. S.

ANNUAL OUTING

AT SANDY MACS GOLF COURSE

8415 TIREMAN AVENUE

DETROIT

Saturday, August 6th, 1938

ALL MEMBERS OF THE A. E. S. INVITED

The Abstract Section

FREDERICK FULFORTH, *Chairman, Program and Educational Committee*

The Electrodeposition of Metals from Non-Aqueous Solutions. By THEODORE P. DIRKSE and H. T. BRISCOE. *Metal Industry*, June 1938, Page 284. The authors reviewed the work done by Audrieth, Yntema, Booth and Torrey in depositing metals from solvents. Described their results with acetamide, monoethanolamine, nitrobenzene, pyridine, benzonitrile, benzoyl chloride, acetone, glacial acetic acid, and phosphorus oxychloride in obtaining deposits of beryllium, aluminum, lead, tin, zinc, magnesium, and manganese. In most cases non-adherent deposits were obtained and no attempt was made to improve them. The experiments were conducted in 100 cc. beakers with electrodes approximately one centimeter square. The anodes were of platinum.

Nickel Plating. By A. C. WEST. *Canadian Metals and Metallurgical Industries*, March 1938, Page 84. A description of the theory of nickel plating, plating equipment, bath composition and control. Nickel sulphate is manufactured in Canada as a by-product of electrolytic copper refining. The impure rejected nickel sulphate is dissolved in water, treated with nickel carbonate to neutralize excess acid, heated, and aerated. This treatment precipitates most of the iron and copper. After filtering, the solution is evaporated and the nickel sulphate crystalized on lead strips. Hydrogen is more noble than nickel and should theoretically deposit at the cathode rather than nickel, but the situation is modified by the comparative high hydrogen overvoltage of the nickel and the fact that concentration of nickel ions is greatly in excess to that of the hydrogen ions. Nickel anodes containing iron and carbon were used in early plating baths because of the ease in which they dissolved. The iron and carbon being more noble than the nickel accelerated the corrosion of the nickel. Modern plating baths employ high purity bagged anodes so that the suspended impurities may be kept at a minimum. The Watt's solution permits the use of current densities as high as 50 amps per sq. ft. Agitation, filtering, and 99%+ anodes are recommended. The absence of sodium and ammonium compounds permit the use of high current densities. The thickness of the plate is the most important single factor responsible for the life of a plated article.

D. S. HARTSHORN, Jr.

Continuous Pickling of Strip Steel, at Republic Steel Corporations New 98″ Strip Mill, by J. J. BOWDEN. *Metal Cleaning & Finishing* June 1938. The author traces the development, of the modern pickling practice of continuous pickling of long strips, from the old method of pickling single sheets in long tanks. The use of inhibitors is discussed, also the accurate chemical and temperature control is outlined. Whereas in the past these matters were done by rule of thumb, today scientific control is practiced.

The process in use at the Republic Steel Corp., new 98″ Strip Mill in Cleveland is as follows; the hot rolled coil is deposited on a coil upsetter by a magnet in a perpendicular position. The coil upsetter then turns 90° putting the coil

in a horizontal position. A processor uncoils the strip, the fish tails are sheared off then it is delivered to a stitching machine which fastens the coil on a preceding one. The coil is then pulled into an accumulator pit. Then to the first acid tank. There are six tanks in tandem. The first four tanks are acid tanks of welded steel construction, live rubber lined plus an additional lining of acid resisting brick. H_2SO_4 is used at 10-12%, temperature 190°F. After leaving acid tanks the strip goes into a cold water tank, finally a hot water tank temp. 185°F.

EDMUND S. JEVELI.

SCIENTIFIC TRAINING OF PERSONNEL

The purpose of this paper is to acquaint the members of the A.E.S. of the trend toward scientific training of personnel in the plating departments of the Jewelry industry in the vicinity of Providence.

For many years the Jewelry industry in New England has felt the need of a more scientific approach to their problems, especially those concerning the operation and control of their electroplating (coloring) departments.

There had been much discussion of remedying this situation but until about two years ago it consisted only of talk. At that time a group of jewelers approached Mr. A. Sidney Rollings, Head of the Jewelry Department of the R. I. S. D. to ascertain if some active work in this direction would be undertaken by the school providing the substantial manufacturing jewelers of the vicinity would cooperate both morally and financially.

Since one of the fundamental purposes in the establishment of the School was to provide a centre for development and advancement of the arts, these manufacturers met with enthusiastic response.

Some time previously the School had attempted to teach electro-plating but the apathetic attitude of the industry at that time forced its abandonment. The equipment, however, remained intact and acted as a nucleus for the present equipment; additional equipment since has been added both in the plating room and the chemical laboratory which, with the contemplated additions planned for this year will enable the handling of any problem that may be encountered in the industry.

That the value of this training is apparent to the workers in this field is shown by the enthusiastic attitude of the students taking the course during these last two years. Most of these students were practical platers who lacked the chemical fundamentals necessary to acquire the utmost efficiency from their practical knowledge and had the desire to exploit their abilities to their full extent. These men by bringing into the classroom the problem which daily confronted them in their work, have assured themselves of the practicability of the scientific approach to the solution of these problems.

In order to realize the problem confronting this venture, it is necessary to understand that most text books and most courses in chemistry stress the other phases and merely skip over lightly those principles dealing with the chemistry of the more metallic elements especially of the precious metals. It was necessary, therefore, to first organize this course so that sufficient stress could be placed upon electro-chemical principles and the study of the metals. Here again it became necessary to correlate the principles of physics with those of chemistry in order that the physical aspect of plating problems be fully realized.

The fundamentals of general chemistry were necessarily retained, more than the usual stress was given to ionization and the applications of the ionic theory, its relationship to conductivity and electrolysis, especially electro-deposition.

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The laws of Faraday and their importance in electro-plating were studied and demonstrated. The electro-motive series and the principles of the voltaic cell were given adequate attention.

The difficulty in preparing this material and presenting it in such a manner that practical electro-platers who have not had the benefit of higher education could understand is quite apparent. This was made possible only through the wholehearted cooperation of all departments of the school.

The principles of physics involved covered the construction and operation of direct current generators and meters in order that the students be able to correlate their function with that of the plating bath. Ohm's law and its practical applications to the electric circuit was adequately discussed.

The principles of analytical chemistry were fully presented even though it had been felt that only a portion of the class would be able to grasp them completely. For the benefit of those unable to assimulate these principles in their entirety alternative methods of a much simpler nature were presented in addition so that all of these students were enabled to at least make analysis of sufficient accuracy for control purposes; many of the students, however, progressed sufficiently in the precise methods of analysis to enable them to attempt research problems in the electro-plating field.

The ultimate success of this course, its value to the electro-plating industry, and to the manufacturers utilizing electro-plating processes is largely dependent on continual and broadened cooperation of all those concerned. You can be assured that the Rhode Island School of Design will do their share in this matter and will be glad to cooperate and exchange ideas with other schools or any group interested in furthering the development of this scientific approach to the solution of the problems of electro-plating.

JOSEPH A. SMITH,
Instructor of Electro-Chemistry,
Rhode Island School of Design,
Providence, Rhode Island.

DETROIT REX OPENS NEW BRANCH OFFICE IN SAN FRANCISCO

The Detroit Rex Products Company, Detroit, Michigan, manufacturers of DETREX degreasers, PERM-A-CLOR and TRIAD solvents, and TRIAD alkali cleaners and strippers, has recently opened a new branch office at One Eleven Sutter Building, San Francisco, California, in charge of W. A. Vensel, West Coast Manager. Ample warehouse stocks of solvents are carried for immediate delivery to all points in this territory.

ABRASIVE BOND

For Setting Up Polishing Wheels and Belts

The polishing industry has long recognized a need for a better medium for holding abrasive grain on polishing wheels. For years animal glue has been used with good results, but has had its drawbacks. Several other adhesives have been used in recent years, but the one to gain the most popularity has been a silicate base cement produced by many companies.

These cements are easy to use and give considerably longer life to a polishing wheel, but due to a natural fault of a silicate base, wheels set up with silicate cement were too harsh cutting, and therefore were not used successfully on polishing wheels that were set up with grain smaller than No. 120.

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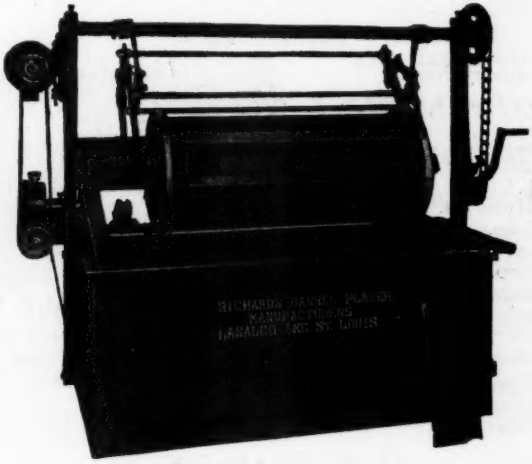

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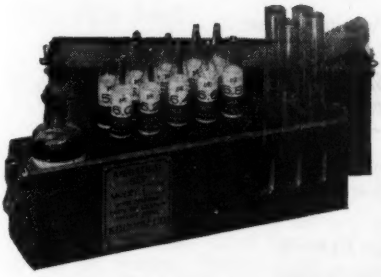

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A SUMMARY ON THE REVISED CONSTITUTION AND BY-LAWS

Each and every member of the A.E.S. is now governed by a new Constitution and By-Laws which was approved and adopted by the delegates at the June, 1938 Annual Meeting. Every member of the society will receive not later than Sept. the Proceedings of the Twenty-sixth Annual Meeting, wherein will be printed all deliberations and actions on the proposed revision as it appeared in the April and May REVIEW. You may then consider for yourself just how the proposed revision was presented, discussed, amended and finally adopted by the delegates assembled. This is an opportunity for many of our members who unfortunately are unable to attend conventions, to learn just how the business of the society is transacted. And I would like to draw attention to the fact that every paragraph of this new constitution and by-laws was adopted by a two-thirds or larger majority vote of the delegates and that every delegate was permitted to present any idea which he or his branch desired to have considered.

It must be emphatically stated that the delegates presented their viewpoint in a masterly manner and are to be congratulated for the arguments which they advanced in support of their suggested amendments to the proposed revision. Past President Wilson who presided at this meeting, handled every situation which presented itself in a very fair and impartial fashion, and I am stating without fear of contradiction, that we could have looked far amongst us and not found a better presiding officer than Mr. Wilson, during the deliberations on the proposed revision and the business meeting which followed. This Session extended over a period of approximately nine hours with only a few short recesses.

Our members will now watch with interest the reaction to the new laws contained in the Revised Constitution and By-Laws which broaden out our associate membership, permit these members to hold any office in the branch society, increase the per capita tax, furnish each member a copy of the Proceedings of the Annual Meeting, permit authors of papers read before branches to decide on their disposal and limit the maximum amount that the branch may retain from Convention profits. It therefore becomes the duty of the delegates and members of the Supreme Society who voted their approval of the Revised Constitution and By-Laws to exercise their utmost vigilance to see that this constitution is adhered to in their respective branches. By doing this there will be attained a greater and better society for "the improvement and dissemination of the arts and science of electro-deposition and all its allied arts: the development of a co-operative spirit of friendship and mutual assistance among its members, and the increase of knowledge of those occupied in the numerous applications of electroplating".

It was voted by the delegates to continue for another year the Committee on the Revision of the Constitution and By-Laws so that they might properly edit and place in the draft of the revised constitution and by-laws all approved changes and amendments. After this is accomplished the draft will be printed in booklet form and soon thereafter distributed to the members.

In conclusion I call on the members of the committee and the members of our Supreme Society to pledge their efforts to repeal or amend in the future any law contained in the Revised Constitution which after a fair trial proves that it is working in a manner detrimental to the interest of the electroplater and the American Electroplaters' Society.

T. F. SLATTERY, Chairman of Committee

CREDIT SHOULD BE GIVEN TO ROCHESTER BRANCH

The Paper presented by Mr. E. A. Anderson of The Jersey Zinc Company on How Zinc Alloy Die Castings are Plated Commercially as published in the June REVIEW were read at the Annual Meeting of Rochester Branch held recently.

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The Hanson-Van Winkle-Munning Company, Matawan, N. J., manufacturers of electroplating equipment and supplies, were the first to offer muslin bags, and later, anode filter bags, in which the nickel anodes were placed. These bags effected a great improvement in the nickel deposits. Within recent years, however, it has become more and more general to use high speed, hot nickel plating solutions, with low pH (high in acid). The destructive action of the sulphuric acid shortened the life of the anode filter bags. Consequently the company has perfected a new type of anode container—the glass cloth bag.

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